METZ VF-47

MODEL

SERVICE MANUAL

Video Cassette Recorder Deck: Turbo Drive APOLLO 12

VR101/02/39/58
VR110/02/07/58
VR200A/02/07/39/58
VR210/02/07/39/58/60
VR215/02/07
VR217/02/07
VR260/02/07/39/58
VR400A/58
VR401/58
VR410/02/39/58
VR460/02/39/58
VR501/02/16/58
VR510/02/07/16/39/58
VR600A/02/07/16/39
VR605A/58
VR607A/02/07/16/39
VR610/02/07/16/39/60
VR617/02/07/16/58
SB130/03/38
SB135/03/07/11/16/38
SB435/11/38
SB535/38
SB635/03/11/16/38
SB735/03/11/38
20DV20/39
25DV20/39
45DV20/39
65DV20/39

Service
Service
Service

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Service Manual

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Survey of versions:

/02/03	PAL B/G, VPS/PDC
/05	PAL I, UK
/07	PAL I, Ireland
/11	PAL B/G, Belgium
/13	PAL B/G, Nordic
/16	PAL B/G, Spain / Nordic
/38/39	SECAM L, L' & PAL B/G, I
/58/59	PAL/SECAM B/G, D/K
/60	PAL/SECAM, D/K

Survey of remote controls:

VR101/02/58, VR110/02/07/58, VR401/58, VR501/02/16/58, SB130/03, SB135/03/07/11/16, SB435/11, SB635/03/11/16, SB735/03/11	**RT116/201**	8622 661 16201
VR101/39, SB130/38, SB13538, SB435/38, SB535/38, SB635/38, SB735/38, 20DV20/39, 25DV20/39, 45DV20/ 39, 65DV20/39	**RT116/204**	8622 661 16204
VR605A/58,VR607A/02/07/16, VR617/02/07/16/58	**RT114/101**	8622 661 14101
VR607A/39	**RT114/104**	8622 661 14104
VR217/02/07, VR260/02/07/58, VR460/02/58, VR600A/02/07/16, VR610/02/07/16	**RT113/101**	8622 661 13101
VR260/39, VR460/39, VR600A/39, VR610/39/60	**RT113/104**	8622 661 13104
VR200A/02/07/58, VR21002/07/58, VR215/0207, VR400A/58, VR41002/58, VR510/02/07/16/58	**RT112/101**	8622 661 12101
VR200A/39, VR210/39/60, VR41039, VR510/39	**RT112/104**	8622 661 12104

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1. Technical specifications, Features, List of PWBs

1.1 Survey of sets and PWB's with software versions

	SYSTEMS												AMB Apollo Mother Board software versions Central Control-µP Pos. 7899							Shuttle Board	CINCH Board	front	TAPE DECK			
	System off air						Rec/Pb standard						Chapter 3, page 1 - 34							35	35	36	Chapter 4			
	PAL BG	PAL I	SECAM BG	SECAM L/L'	PAL/SECAM DK	SECAM K1	PAL	SECAM	MESECAM	Pb NTSC on PAL TV	Pb Black & White		ACAP1-xU	ACAP2-xU	ACAP3-xU	ACAP4-xU	ACAP5-xU	ACAP6-xU	ACAB1-xU	ASP10	ACP10	QBOG1	A12T-P2/0	A12T-P2/0LP	AT-S4/0	AT-S4/2
VR101/02	✔						✔			✔									✔				✔			
VR101/39	✔	✔	✔	✔			✔	✔	✔	✔									✔				✔			
VR101/58	✔		✔		✔		✔		✔	✔									✔				✔			
VR110/02	✔						✔						✔										✔			
VR110/07		✔					✔						✔											✔		
VR110/58	✔		✔		✔		✔		✔	✔			✔										✔			
VR200A/02	✔						✔				✔								✔				✔			
VR200A/07		✔					✔				✔								✔					✔		
VR200A/39	✔	✔	✔	✔			✔	✔	✔	✔	✔								✔				✔			
VR200A/58	✔		✔		✔		✔		✔	✔	✔								✔				✔			
VR210/02	✔						✔				✔						✔						✔			
VR210/07		✔					✔				✔							✔						✔		
VR210/39	✔	✔	✔	✔			✔	✔	✔		✔						✔						✔			
VR210/58	✔		✔		✔		✔		✔	✔	✔				✔								✔			
VR210/60						✔	✔	✔	✔		✔						✔						✔			
VR215/02	✔						✔			✔	✔						✔							✔		
VR215/07		✔					✔			✔	✔							✔						✔		
VR217/02	✔						✔			✔	✔						✔							✔		
VR217/07		✔					✔			✔	✔							✔						✔		
VR260/02	✔						✔			✔	✔						✔				✔			✔		
VR260/07		✔					✔			✔	✔							✔			✔			✔		
VR260/39	✔	✔	✔	✔			✔	✔	✔	✔	✔						✔				✔		✔			
VR260/58	✔		✔		✔		✔		✔	✔	✔				✔						✔			✔		
VR400A/58	✔		✔		✔		✔		✔	✔	✔								✔						✔	
VR401/58	✔		✔		✔		✔		✔	✔			✔												✔	
VR410/02	✔						✔			✔	✔						✔								✔	
VR410/39	✔	✔	✔	✔			✔	✔	✔	✔	✔						✔								✔	
VR410/58	✔		✔		✔		✔		✔	✔	✔				✔										✔	
VR460/02	✔						✔			✔	✔						✔				✔				✔	
VR460/39	✔	✔	✔	✔			✔	✔	✔	✔	✔						✔				✔				✔	
VR460/58	✔		✔		✔		✔		✔	✔	✔				✔						✔				✔	
VR501/02	✔						✔												✔							✔
VR501/16	✔						✔												✔							✔
VR501/58	✔		✔		✔		✔		✔	✔									✔							✔
VR510/02	✔						✔			✔	✔			✔												✔
VR510/07		✔					✔			✔	✔							✔								✔
VR510/16	✔						✔			✔	✔					✔										✔
VR510/39	✔	✔	✔	✔			✔	✔	✔	✔	✔			✔												✔
VR510/58	✔		✔		✔		✔		✔	✔	✔				✔											✔

	SYSTEMS												AMB Apollo Mother Board software versions Central Control-µP Pos. 7899							Shuttle Board	CINCH Board front		TAPE DECK			
	System off air						Rec/Pb standard						Chapter 3, page 1 - 34							35	35	36	Chapter 4			
	PAL BG	PAL I	SECAM BG	SECAM L/L’	PAL/SECAM DK	SECAM K1	PAL	SECAM	MESECAM	Pb NTSC on PAL TV	Pb Black & White		ACAP1-xU	ACAP2-xU	ACAP3-xU	ACAP4-xU	ACAP5-xU	ACAP6-xU	ACAB1-xU	ASP10	ACP10	QBOG1	A12T-P2/0	A12T-P2/0LP	AT-S4/0	AT-S4/2
VR600A/02	✔						✔			✔	✔								✔		✔					✔
VR600A/07		✔					✔			✔	✔								✔		✔					✔
VR600A/16	✔						✔			✔	✔								✔		✔					✔
VR600A/39	✔	✔	✔	✔			✔	✔	✔	✔	✔								✔		✔					✔
VR605A/58	✔		✔		✔		✔		✔	✔	✔								✔	✔	✔					✔
VR607A/02	✔						✔			✔	✔								✔	✔	✔					✔
VR607A/07		✔					✔			✔	✔								✔	✔	✔					✔
VR607A/16	✔						✔			✔	✔								✔	✔	✔					✔
VR607A/39	✔	✔	✔	✔			✔	✔	✔	✔	✔								✔	✔	✔					✔
VR610/02	✔						✔			✔	✔			✔												✔
VR610/07		✔					✔			✔	✔							✔								✔
VR610/16	✔						✔			✔	✔					✔										✔
VR610/39	✔	✔	✔	✔			✔	✔	✔	✔	✔			✔												✔
VR610/60						✔	✔	✔	✔	✔	✔			✔												✔
VR617/02	✔						✔			✔	✔			✔												✔
VR617/07		✔					✔			✔	✔							✔								✔
VR617/16	✔						✔			✔	✔					✔										✔
VR617/58	✔				✔		✔		✔	✔	✔				✔											✔
SB130/03	✔						✔						✔										✔			
SB130/38	✔	✔	✔	✔			✔	✔	✔				✔										✔			
SB135/03	✔						✔			✔	✔								✔				✔			
SB135/07		✔					✔			✔	✔								✔					✔		
SB135/11	✔						✔			✔	✔								✔				✔			
SB135/16	✔						✔			✔	✔								✔				✔			
SB135/38	✔	✔	✔	✔			✔	✔	✔	✔	✔								✔				✔			
SB435/11	✔						✔			✔	✔								✔						✔	
SB435/38	✔	✔	✔	✔			✔	✔	✔	✔	✔								✔						✔	
SB535/38	✔	✔	✔	✔			✔	✔	✔	✔	✔								✔			✔			✔	
SB635/03	✔						✔			✔	✔								✔							✔
SB635/11	✔						✔			✔	✔								✔							✔
SB635/16	✔						✔			✔	✔								✔							✔
SB635/38	✔	✔	✔	✔			✔	✔	✔	✔	✔								✔							✔
SB735/03	✔						✔			✔	✔								✔			✔				✔
SB735/11	✔						✔			✔	✔								✔			✔				✔
SB735/38	✔	✔	✔	✔			✔	✔	✔	✔	✔								✔			✔				✔
20D V20/39	✔	✔	✔	✔			✔	✔	✔				✔										✔			
25D V20/39	✔	✔	✔	✔			✔	✔	✔	✔	✔								✔				✔			
45D V20/39	✔	✔	✔	✔			✔	✔	✔	✔	✔								✔						✔	
65D V20/39	✔	✔	✔	✔			✔	✔	✔	✔	✔								✔							✔

1.2 Features

	VR101/02	VR101/39	VR101/58	VR110/02	VR110/07	VR110/58	VR200A/02	VR200A/07	VR200A/39	VR200A/58	VR210/02	VR210/07	VR210/39	VR210/58	VR210/60	VR215/02	VR215/07	VR217/02	VR217/07	VR260/02
General																				
Low power Standby [W]	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Auto Standby ON/OFF	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Backup of presets (yr)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Backup of clock / timer (hrs)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Tuning presets	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
Number of events / month	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Systems																				
Sound system: mono	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sound system: stereo																				
Sound system: Nicam																				
Cable tuner hyperband, VHF/UHF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Splitter		✓							✓				✓		✓					
Modulator Ch 21 - 55 (manual adjust)	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓		✓		✓	✓	✓	✓	✓
Modulator Auto Seek								✓				✓					✓		✓	
Mechanism																				
Video heads	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
FM-audio heads (for stereo)																				
Head cleaning mode automatic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Winding time E180 [sec]	260	260	260	260	260	260	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Rewind time E180 [sec]	170	170	170	170	170	170	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Quick View	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tape lenghts recognition automatic							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tape counter: linear relative (h.m.s.)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tape counter: time left (h.m.)							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VISS: next/prev. index / blank tape search	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Features																				
Plug & Play	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
OSD	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Auto -search, -store, -tuning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Easy Link (P50)											✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Follow TV (analog)	✓	✓	✓						✓	✓										
Direct Record (analog)	✓	✓	✓						✓	✓										
16:9 (pin 8) switch											✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Plug & Play	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Studio Picture Control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Commercial Skip																				✓
Turbo Timer							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Daily/weekly	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Show View (SV) / Video Plus+(V+)	SV	SV	SV				SV	V+	SV	SV	SV	V+	SV	SV	SV	SV	V+	SV	V+	SV
VPS+PDC (VPD)	VPD	VPD	VPD				VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD
Time (VPDC) Date (PDC) download	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Record-prepared mode (from SCART 2)	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sat control via Mouse	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Child lock	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TV - Remote Multicode																		✓	✓	✓
VCR1/VCR2 selection																		✓	✓	✓
OTR	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Longplay					✓			✓				✓				✓	✓	✓	✓	✓
Auto Longplay																✓	✓	✓	✓	✓
Continuous playback	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Audio dubbing	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Connectors																				
Audio out: cinch (rear)																				
Audio / Video in: cinch (front)																				✓
Number of scart connectors	2	2	2	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
ShowView mapping																		✓		✓

	VR260/07	VR260/39	VR260/58	VR400A/58	VR401/58	VR410/02	VR410/39	VR410/58	VR460/02	VR460/39	VR460/58	VR501/02	VR501/16	VR501/58	VR510/02	VR510/07	VR510/16	VR510/39	VR510/58
General																			
Low power Standby [W]	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Auto Standby ON/OFF	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Backup of presets (yr)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Backup of clock / timer (hrs)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Tuning presets	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
Number of events / month	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Systems																			
Sound system: mono	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sound system: stereo												✓	✓	✓	✓	✓	✓	✓	✓
Sound system: Nicam													✓	✓		✓	✓	✓	✓
Cable tuner hyperband, VHF/UHF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Splitter		✓					✓			✓								✓	
Modulator Ch 21 - 55 (manual adjust)	✓		✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓		✓
Modulator Auto Seek	✓															✓			
Mechanism																			
Video heads	2	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
FM-audio heads (for stereo)												2	2	2	2	2	2	2	2
Head cleaning mode automatic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Winding time E180 [sec]	100	100	100	100	100	100	100	100	100	100	100	260	260	260	100	100	100	100	100
Rewind time E180 [sec]	100	100	100	100	100	100	100	100	100	100	100	170	170	170	100	100	100	100	100
Quick View	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tape lenghts recognition automatic	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓
Tape counter: linear relative (h.m.s.)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tape counter: time left (h.m.)	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓
VISS: next/prev. index / blank tape search	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Features												✓	✓	✓	✓	✓	✓	✓	✓
Plug & Play	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
OSD	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Auto -search, -store, -tuning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Easy Link (P50)	✓	✓	✓			✓	✓	✓	✓	✓	✓								
Follow TV (analog)				✓								✓	✓	✓					
Direct Record (analog)				✓								✓	✓	✓					
16:9 (pin 8) switch	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
Plug & Play	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Studio Picture Control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Commercial Skip	✓	✓	✓						✓	✓	✓								
Turbo Timer	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓
Daily/weekly	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Show View (SV) / Video Plus+(V+)	V+	SV	SV	SV		SV	SV	SV	SV	SV	SV	SV	SV	SV	SV	V+	SV	SV	SV
VPS+PDC (VPD)	VPD	VPD	VPD	VPD		VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD
Time (VPDC) Date (PDC) download	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Record-prepared mode (from SCART 2)	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sat control via Mouse	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Child lock	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TV - Remote Multicode	✓	✓	✓						✓	✓	✓								
VCR1/VCR2 selection	✓	✓	✓						✓	✓	✓								
OTR	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Longplay	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Auto Longplay	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓
Continuous playback	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Audio dubbing	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Connectors																			
Audio out: cinch (rear)												✓	✓	✓	✓	✓	✓	✓	✓
Audio / Video in: cinch (front)	✓	✓	✓						✓	✓	✓								
Number of scart connectors	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
ShowView mapping	✓	✓	✓						✓	✓	✓								

	VR600A/02	VR600A/07	VR600A/16	VR600A/39	VR605A/58	VR607A/02	VR607A/07	VR607A/16	VR607A/39	VR610/02	VR610/07	VR610/16	VR610/39	VR610/60	VR617/02	VR617/07	VR617/16	VR617/58	SB130/03	SB130/38
General																				
Low power Standby [W]	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Auto Standby ON/OFF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Backup of presets (yr)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Backup of clock / timer (hrs)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Tuning presets	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
Number of events / month	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Systems																				
Sound system: mono	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sound system: stereo	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Sound system: Nicam		✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓		✓	✓	✓		
Cable tuner hyperband, VHF/UHF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Splitter				✓					✓				✓	✓						✓
Modulator Ch 21 - 55 (manual adjust)	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓			✓	✓	✓	✓	✓	
Modulator Auto Seek		✓					✓				✓					✓				
Mechanism																				
Video heads	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2	2
FM-audio heads (for stereo)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
Head cleaning mode automatic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Winding time E180 [sec]	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	260	260
Rewind time E180 [sec]	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	170	170
Quick View	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tape lenghts recognition automatic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Tape counter: linear relative (h.m.s.)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tape counter: time left (h.m.)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
VISS: next/prev. index / blank tape search	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Features																				
Plug & Play	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
OSD	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Auto -search, -store, -tuning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Easy Link (P50)										✓	✓	✓	✓	✓	✓	✓	✓	✓		
Follow TV (analog)	✓	✓	✓	✓	✓	✓	✓	✓	✓											
Direct Record (analog)	✓	✓	✓	✓	✓	✓	✓	✓	✓											
16:9 (pin 8) switch										✓	✓	✓	✓	✓	✓	✓	✓	✓		
Plug & Play	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Studio Picture Control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Commercial Skip															✓	✓	✓	✓		
Turbo Timer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Daily/weekly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Show View (SV) / Video Plus+(V+)	SV	V+	SV	SV	SV	SV	V+	SV	SV	SV	V+	SV	SV	SV	SV	V+	SV	SV		
VPS+PDC (VPD)	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD		
Time (VPDC) Date (PDC) download	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Record-prepared mode (from SCART 2)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Sat control via Mouse	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Child lock	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TV - Remote Multicode	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
VCR1/VCR2 selection	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
OTR	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Longplay	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Auto Longplay										✓	✓	✓	✓	✓	✓	✓	✓	✓		
Continuous playback	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Audio dubbing	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Connectors																				
Audio out: cinch (rear)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Audio / Video in: cinch (front)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Number of scart connectors	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2
ShowView mapping															✓	✓		✓		

	SB135/03	SB135/07	SB135/11	SB135/16	SB135/38	SB435/11	SB435/38	SB535/38	SB635/03	SB635/11	SB635/16	SB635/38	SB735/03	SB735/11	SB735/38	20DV20/39	25DV20/39	45DV20/39	65DV20/39
General																			
Low power Standby [W]	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Auto Standby ON/OFF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Backup of presets (yr)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Backup of clock / timer (hrs)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Tuning presets	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
Number of events / month	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Systems																			
Sound system: mono	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sound system: stereo									✓	✓	✓	✓	✓	✓	✓				✓
Sound system: Nicam										✓	✓	✓		✓	✓				✓
Cable tuner hyperband, VHF/UHF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Splitter					✓		✓	✓				✓			✓	✓	✓	✓	✓
Modulator Ch 21 - 55 (manual adjust)	✓	✓	✓	✓		✓			✓	✓	✓		✓	✓					
Modulator Auto Seek		✓																	
Mechanism																			
Video heads	2	2	2	2	2	4	4	4	4	4	4	4	4	4	4	2	2	4	4
FM-audio heads (for stereo)									2	2	2	2	2	2	2				2
Head cleaning mode automatic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Winding time E180 [sec]	260	260	260	260	260	260	260	100	260	260	260	260	100	100	100	260	260	260	260
Rewind time E180 [sec]	170	170	170	170	170	170	170	100	170	170	170	170	100	100	100	170	170	170	170
Quick View	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tape lenghts recognition automatic								✓					✓	✓	✓				
Tape counter: linear relative (h.m.s.)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tape counter: time left (h.m.)								✓					✓	✓	✓				
VISS: next/prev. index / blank tape search	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Features																			
Plug & Play	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
OSD	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Auto -search, -store, -tuning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Easy Link (P50)																			
Follow TV (analog)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Direct Record (analog)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
16:9 (pin 8) switch								✓	✓	✓	✓	✓	✓	✓	✓				✓
Plug & Play	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Studio Picture Control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Commercial Skip																			
Turbo Timer																			
Daily/weekly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Show View (SV) / Video Plus+(V+)	SV	V+	SV	SV	SV	SV	SV	SV	SV	SV	SV	SV	SV	SV	SV		SV	SV	SV
VPS+PDC (VPD)	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD		VPD	VPD	VPD
Time (VPDC) Date (PDC) download	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Record-prepared mode (from SCART 2)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Sat control via Mouse	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Child lock	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TV - Remote Multicode								✓					✓	✓	✓				
VCR1/VCR2 selection																			
OTR	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Longplay		✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Auto Longplay		✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Continuous playback	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Audio dubbing	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Connectors																			
Audio out: cinch (rear)									✓	✓	✓	✓	✓	✓	✓				✓
Audio / Video in: cinch (front)								✓					✓	✓	✓				
Number of scart connectors	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
ShowView mapping																			

1.3 Technical specification

Mains voltage	:220 - 240 V, +/- 10%
Mains frequency	: 45 - 65 Hz
Power consumption	: mono 12.5 W during operation : HiFi 16 W during operation
without Low Power Standby	: mono 4 W during standby : HiFi 4.4 W during standby
with Low Power Standby	: < 4 W standby
Ambient temperature	: +10°C to +35°C
Relative humidity	: 20 - 80 %
Dimensions	: 380 x 260 x 94 mm
Weight	: 3,7 kg
Fast forward/rewind time (turbo)	: typ. 100s (E180 cass.)
Position of use	: horizontally, max. 15°
Video resolution	: ≥240 lines
Audio SP: Linear Audio	: 80Hz - 10kHz (±6 dB)
Audio LP: Linear Audio	: 80Hz - 5kHz (±6 dB)
Stereo FM Audio	: 20Hz - 20kHz (±3dB)

Euroconnector (AV1) SCART plug 1
Connection to TV, monitor, projection TV ...

Pin 1	ARO (audio right out)	500 mV_{rms} +/- 3 dB	R_{out}	1 kOhm
Pin 2	ARI (audio right in)	0,2 V_{rms} to $2V_{rms}$	R_{in}	10 kOhm
Pin 3	ALO (audio left out)	500 mV_{rms} +/- 3 dB	R_{out}	1 kOhm
Pin 6	ALI (audio left in)	0,2 V_{rms} to 2 V_{rms}	R_{in}	10 kOhm
Pin 7	Blue (out) **)			
Pin 8	Switching output:	(with R_{load} = 10kOhm, C_{load}<2nF) low: 2 V high: 9.5 V rise time: 5 ms		
Pin 11	Green (out) **)			
Pin 15	Red (out) **)			
Pin 16	Blanking (out) **)	loop through enabled during standby, view-mode		
Pin 19	CVBS II (video out)	1 V_{pp} +1/-2dB	R_{out}	75 Ohm
Pin 20	CVBS I (video in)	1 V_{pp} +3/-3dB	R_{in}	75 Ohm

**) passive loop through from AV2

Euroconnector (AV2) SCART plug 2
Connection to decoder, SAT tuner, video disc, 2nd VCR ...

Pin 1	ARO (audio right out)	500 mV_{rms} +/- 3 dB	R_{out}	1 kOhm
Pin 2	ARI (audio right in)	0,2 V_{rms} to $2V_{rms}$	R_{in}	10 kOhm
Pin 3	ALO (audio left out)	500 mV_{rms} +/- 3 dB	R_{out}	1 kOhm
Pin 6	ALI (audio left in)	0,2 V_{rms} to 2 V_{rms}	R_{in}	10 kOhm
Pin 7	Blue (out) **)			
Pin 8	Switching input only:	low: 2 V (low)	R_{in}	10 kOhm
		high: 4.5 V (high)	R_{in}	10 kOhm
Pin 11	Green (in) *)			
Pin 15	Red (in) *)			
Pin 16	Blanking (in) *)	loop through enabled during standby, view-mode		
Pin 19	CVBS II (video out)	1 V_{pp} +1/-2dB	R_{out}	75 Ohm
Pin 20	CVBS I (video in)	1 V_{pp} +3/-3dB	R_{in}	75 Ohm

*) passive loop through to Euroconnector AV1

Cinch Audio/Video input on front panel (OPTION)

Audio:

AINFR (audio right in) red	0.2 V_{rms} to 2 V_{rms}	typ. 500 mV_{rms}
AINFL (audio left in) white	0.2 V_{rms} to 2 V_{rms}	typ. 500 mV_{rms}
Input impedance	47 kOhm	

Video:

VFR yellow	1 Vpp + 3 / -3 dB
Input impedance	75 Ohm

Cinch Audio Out Rear (OPTION)

AOUT1R (audio right out) red	500 mV_{rms} +/- 3 dB R_{out} 1 kOhm
AOUT1L (audio left out) white	500 mV_{rms} +/- 3 dB R_{out} 1 kOhm

This outputs are in parallel with the corresponding outputs on Euroconnector 1.

TUMOD

Modulator:

Frequency range loop through		45 MHz - 860 MHz
Gain:	ANT IN - TV OUT	2 dB + 3 / -2 dB
	ANT IN - TUN OUT	2 dB + 3 / -2 dB
Switch for RF input attenuation		NO
Frequency range out (tuned by IIC bus)		Ch 21 - Ch55

Tuner:

Frequency range		43 MHz - 860 MHz
	for UK	450 MHz - 860MHz
Input voltage	max.	< 100 dBµV
	min.	> 60 dBµV

2. Safety instructions, Modifications

2.1 Safety instructions

- Safety regulations demand that the set be restored to its original condition and that components identical with the original types be used.
- Safety components are marked by the symbol ⚠
- All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD). Careless handling during repair may reduce life drastically. When repairing, make sure that you are conneted with the same potential as the mass of the set via a wrist wrap with resistance. Keep components and tools on the same potential.
- A set to be repaired should always be connected to the mains via a suitable isolating transformer.
- Never replace any modules or any other parts while the set is switched on.
- Use plastic instead of metal alignment tools. This in order to prelude short-circuit or to prevent a specific circuit from being rendered unstable.

2.1.1 Remarks

- The direct voltages and oscillograms ought to be measured relative to the set mass.
- The direct voltages and oscillograms mentioned in the diagrams ought to be measured with a colour bar signal and the picture carrier at 503.25 MHz (C25).
- The oscillograms and direct voltages have been measured in RECORD or PLAY mode.
- The semiconductors, which are mentioned in the circuit diagram and in the parts lists, are fully exchangeable per position with the semiconductors in the set, irrespective of the type designation of these semiconductors.

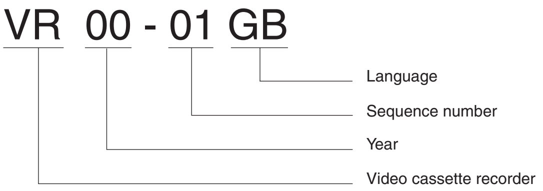
Engineer's remarks:

2.2 Modifications

2.2.1 Updating the service manual

All modifications and/or supplements to the Service Manual are published by means of Service Information bulletins.

Each Service Information is numbered:


VR 00 - 01 GB
Language
Sequence number
Year
Video cassette recorder

A Service Information bulletin consists of a front page which, if needed, is followed by supplementary and/or replacement sheets.

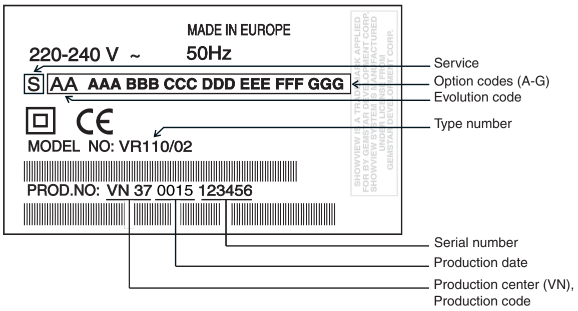
Replacement sheets should replace existing sheets in the Service Manual. These sheets are identified by an additional letter after the page number.
Example: Page 5-1a replaces page 5-1 in the Service Manual.

Supplementary sheets should be inserted between existing sheets in the Service Manual. These sheets are identified by an additional figure after the page number.
Example: Page 5-1-1 should be inserted after page 5-1.

2.2.2 Modifications in the set

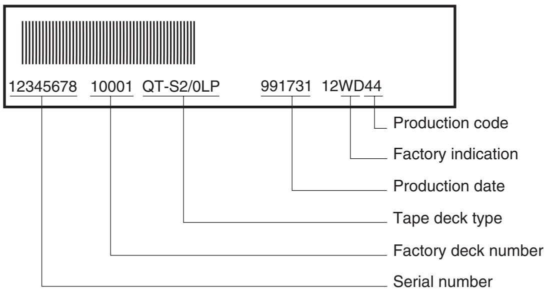
All important parts of the set (such as the tape deck, the printed circuits and modules) are equiped with a sticker. Those stickers provide a number of important information.

Type plate
The type plate is located on the back cover.


MADE IN EUROPE
220-240 V ~
50Hz
S AA AAA BBB CCC DDD EEE FFF GGG
CE
MODEL NO: VR110/02
PROD.NO: VN 37 0015 123456
SHOWVIEW IS A TRADEMARK APPLIED FOR BY GEMSTAR DEVELOPMENT CORP. SHOWVIEW SYSTEM IS MANUFACTURED UNDER LICENSE FROM GEMSTAR DEVELOPMENT CORP.
Service
Option codes (A-G)
Evolution code
Type number
Serial number
Production date
Production center (VN), Production code

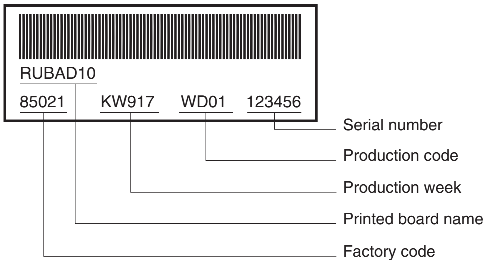
Note:
- In case of an important change in the set, the production code on the type plate is incremented: E.g. 37 becomes 38.
- In case of a major change in the set, the evolution code is incremented: E.g. AA becomes AB.

Tape deck


12345678 10001 QT-S2/0LP 991731 12WD44
Production code
Factory indication
Production date
Tape deck type
Factory deck number
Serial number

Note:
- The production code and the serial number on the tape deck do not correspond to the production code and the serial number on the type plate.

Printed circuits
The sticker is generally located on the copper side of the board.
Example:

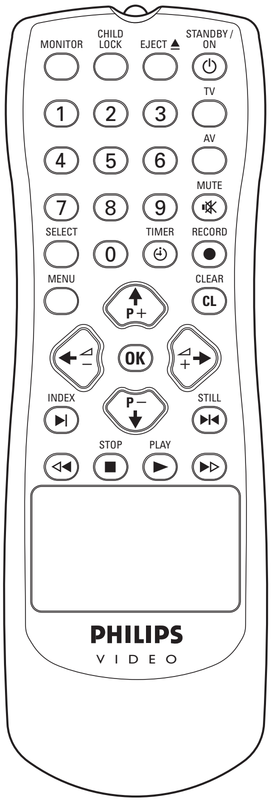

RUBAD10
85021 KW917 WD01 123456
Serial number
Production code
Production week
Printed board name
Factory code

Note:
- The production code number might not always be mentioned.

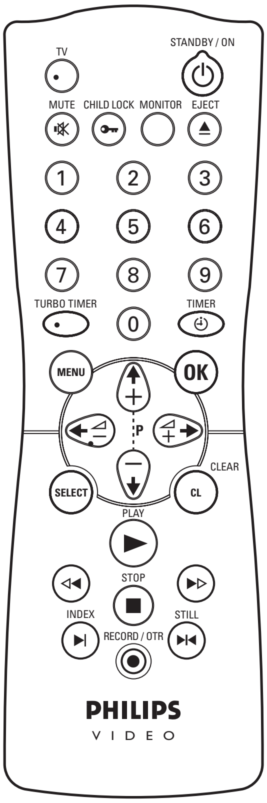
In case of an important modification, the last figure of the factory code number (point number) is increased by one: E.g. 8502.1 becomes 8502.2

3. Direction for use

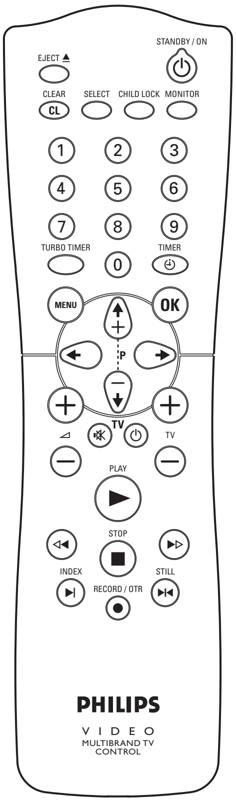
Remote control:


MONITOR
CHILD LOCK
EJECT ▲
STANDBY / ON
TV
AV
MUTE
SELECT
TIMER
RECORD
MENU
CLEAR
CL
P+
OK
P–
INDEX
STILL
STOP
PLAY
PHILIPS
VIDEO

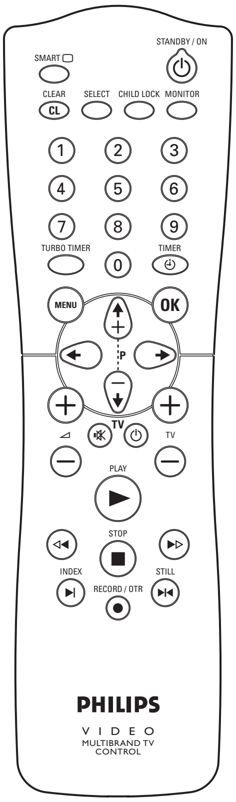
RT111
RT116


TV
STANDBY / ON
MUTE
CHILD LOCK
MONITOR
EJECT
TURBO TIMER
TIMER
MENU
OK
P
SELECT
CL
CLEAR
PLAY
STOP
INDEX
STILL
RECORD / OTR
PHILIPS
VIDEO

RT112


EJECT ▲
STANDBY / ON
CLEAR
CL
SELECT
CHILD LOCK
MONITOR
TURBO TIMER
TIMER
MENU
OK
P
TV
TV
PLAY
STOP
INDEX
STILL
RECORD / OTR
PHILIPS
VIDEO
MULTIBRAND TV CONTROL

RT113


SMART
STANDBY / ON
CLEAR
CL
SELECT
CHILD LOCK
MONITOR
TURBO TIMER
TIMER
MENU
OK
P
TV
TV
PLAY
STOP
INDEX
STILL
RECORD / OTR
PHILIPS
VIDEO
MULTIBRAND TV CONTROL

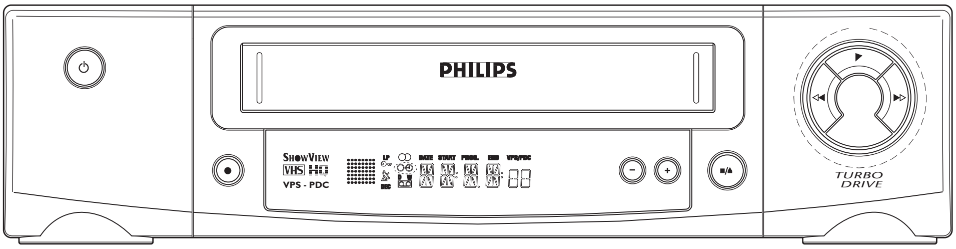
RT114

Remote control

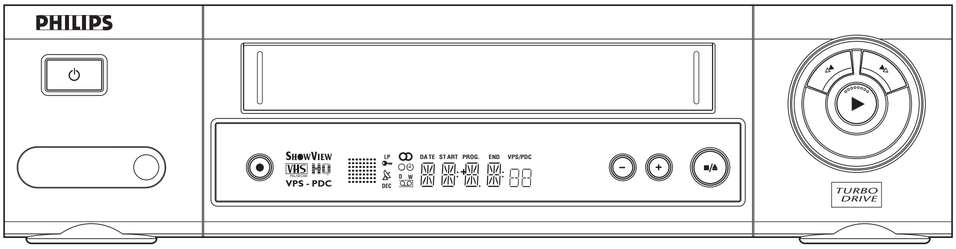
SMART	**SMART**: To adjust the picture setting during playback
STANDBY/ON ⏻	**Switch off** : To switch off set, interrupt menu function, interrupt a programmed recording (TIMER)
CLEAR (CL)	**Delete** : To delete last entry/Clear programmed recording (TIMER)
SELECT	**Select**: To select a function
CHILD LOCK	**Child Lock** : To switch child lock on/off
MONITOR	**TV monitor** : To switch between TV reception and VCR playback
0-9	**Number buttons**: 0 - 9
TURBO TIMER	**TurboTimer**Aufnahmen programmieren mit der Funktion TurboTimer
TIMER ⏲	**TIMER**: To make a manual TIMER programming or to alter or clear a programmed TIMER
MENU	**Menu** : To call up or end main menu
OK	**Store/Confirm**: To store or confirm entry
←	**Select**: Cursor left
→	**Select**: Cursor right
↑→+	**Select**: To select a programme number
−→↓	**Select**: To select a programme number
PLAY ▶	**Playback** : To play a recorded cassette
◁◀	**Rewind** : During STOP and STANDBY: rewind, during PLAYBACK: reverse scanning
STOP ■	**Pause/Stop**: To stop the tape, except while a TIMER-recording is being made
▶▷	**Forward wind**: During STOP and STANDBY: forward wind, during PLAYBACK: forward scanning
INDEX ▶❘	**Index search**: In combination with ◁◀/▶▷: to search for previous or next recording on the cassette.
RECORD ●	**Record**: To record the programme selected
STILL ▶❘◀	**Still picture** : To stop the tape and show a still picture

Additional TV functions

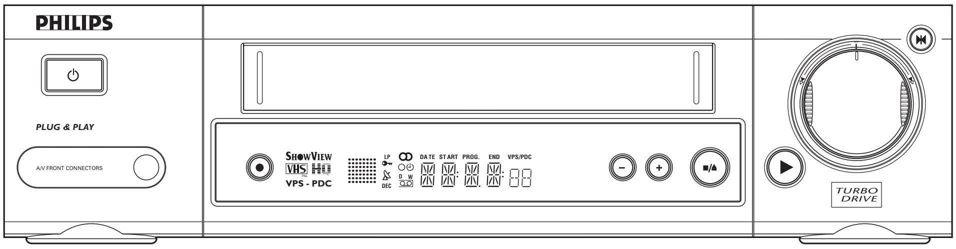
⊿+	**TV volume**: TV volume up
⊿−	**TV volume**: TV volume down
TV 🔇	**TV sound off** : To switch the sound on or off
TV ⏻	**Switch off** : To switch off the TV
TV+	**TV Programme number**: TV programme number up
TV−	**TV Programme number**: TV programme number down


PHILIPS
ShowView
VPS - PDC
LP
DEC
DATE START PROG. END VPS/PDC
TURBO DRIVE

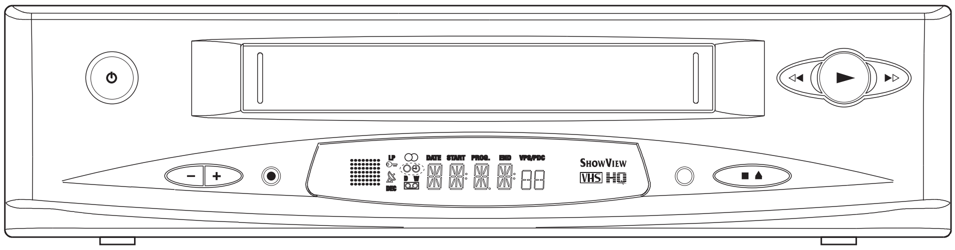
VR200A
VR400A


PHILIPS
ShowView
VPS - PDC
LP
DEC
DATE START PROG. END VPS/PDC
TURBO DRIVE

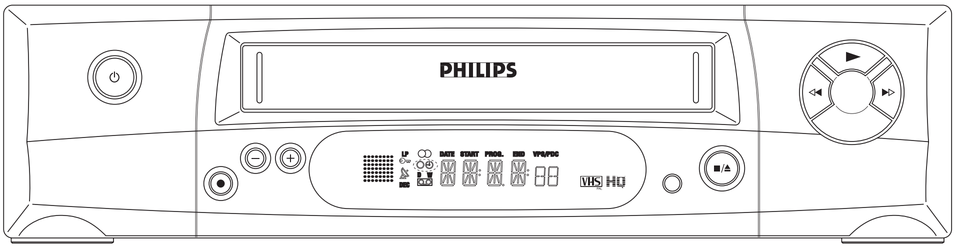
VR600A


PHILIPS
PLUG & PLAY
A/V FRONT CONNECTORS
ShowView
VPS - PDC
LP
DEC
DATE START PROG. END VPS/PDC
TURBO DRIVE

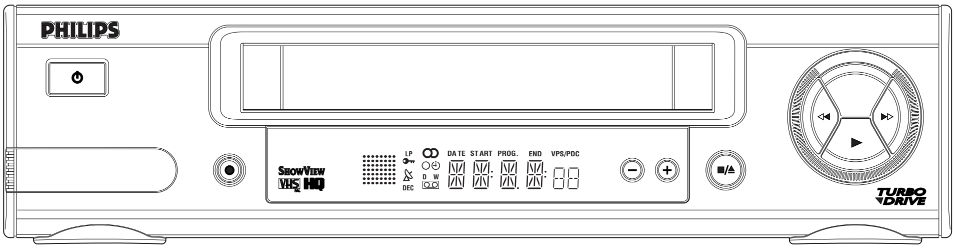
VR605A
VR607A


LP
DEC
DATE START PROG. END VPS/PDC
ShowView

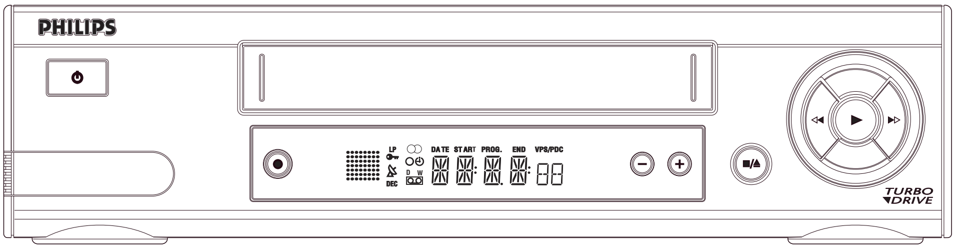
VR101
VR501


PHILIPS
LP
DEC
DATE START PROG. END VPS/PDC

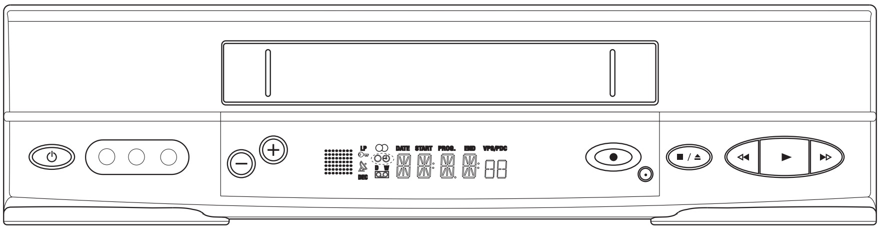
VR110
VR401
VR510


PHILIPS
ShowView
LP
DEC
DATE START PROG. END VPS/PDC
TURBO DRIVE

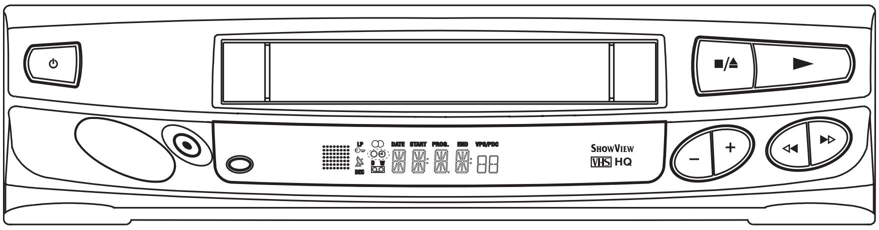
VR210
VR410


PHILIPS
LP
DEC
DATE START PROG. END VPS/PDC
TURBO DRIVE

VR215
VR217
VR260
VR460
VR610
VR617



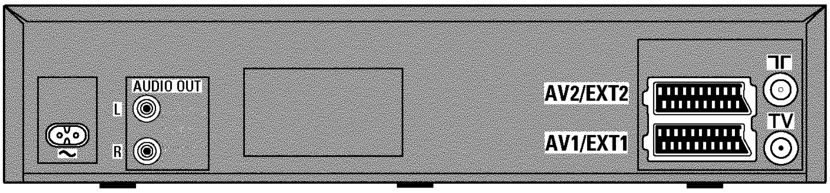
SB130
SB135
SB435



20DV20
25DV20

STANDBY ⏻	**Standby** : To switch off or on, interrupt a function, interrupt a programmed recording (TIMER)
RECORD ●	**Record**: To record the programme selected
AUDIO	**Audio input socket left/right** : To connect a camera recorder or video recorder (programme number *'E3'*)
VIDEO	**Video input socket** : To connect a camera recorder or video recorder (*'E3'*)
PROGRAMME –	**Select**: One line or programme number down.
PROGRAMME +	**Select**: One line or programme number up.
MONITOR	**TV monitor** : To switch between TV reception and VCR playback
◁◀	**Rewind** : During STOP and STANDBY: rewind, during PLAYBACK: reverse scanning
PLAY ▶	**Playback** : To play a cassette
▶▷	**Forward wind**: During STOP and STANDBY: forward wind, during PLAYBACK: forward scanning
STOP/EJECT ●/▲	**Pause/Stop, eject cassette**: To stop the tape and eject the cassette

Rearside



∼	**Mains socket**: To connect the mains cable
AUDIO OUT L R	**Audio output socket, left/right** : To connect a HiFi-set
AV2 EXT2	**Scart socket 2**: To connect a satellite receiver, decoder, video recorder, etc. (programme number *'E3'*)
AV1 EXT1	**Scart socket 1**: To connect the TV set (programme number *'E3'*)
┐┌	**Aerial input socket**: To connect the aerial cable
TV	**Aerial output socket**: To connect the TV set

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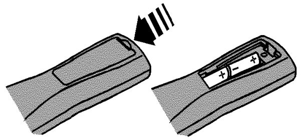
Special functions on your video recorder

Digital Studio Picture Control	Philips has developed a system which produces the best possible playback quality. It reduces disturbance on old, worn video cassettes, and emphasises the detail on very good quality cassettes.
Smart Picture	This function allows you to save the playback settings that suit you best. Select your own personal settings for the type of film you are currently watching.
easy LINK	Philips provides the best possible connection between your video recorder and other home cinema equipment.
Plug & Play	When you connect your video recorder to your television and plug it into the mains, you will be welcomed with an OSD picture. All you have to do is follow the instructions in the "intelligent help line" for the next step. Enjoy the Automatic TV channel search/save function and the automatic time adjustment.
Multibrand TV control	You can operate the main functions on your television using your video recorder remote control, even if your television is not a Philips one.
Automatic Satellite Recording	Recordings made on your video recorder can be controlled by an external satellite receiver.
Direct Record	Your video recorder can ascertain which channel is currently playing on your television and record from it at the touch of a button.
SHOWVIEW® DELUXE	Simple programming system for video recorders. Makes programming as easy as making a telephone call. Simply enter the programme code which you will find in your listings magazine.

1. CONNECTING YOUR VIDEO RECORDER

Placing the batteries in the remote control

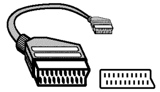
1 Open up the battery compartment of your remote control and place the batteries in it as shown in the picture.



2 Close the battery compartment.

Connecting your video recorder to the TV set

We recommend the use of a scart cable. This will give you the best picture and sound quality.



If you install your video recorder for the first time, select one of the following options:

☐ **'Connecting with a scart cable and Easy Link'**
If your TV set is equipped with 'Easy Link/NexTView, Megalogic,...'.

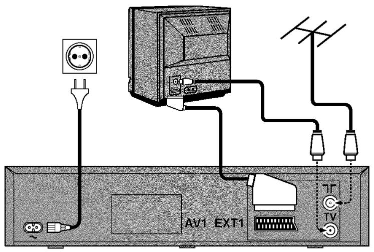
☐ **'Connecting with a scart cable without Easy Link'**
If your TV set is not equipped with 'Easy Link/NexTView, Megalogic,...'.

☐ **'Connecting without a scart cable'**
If you are not using a scart cable.

Connecting with a scart cable and 'Easy link'

easy LINK

With the function 'Easy Link', your video recorder can exchange information with the television (see instruction manual TV set.). With 'Easy Link' the TV channels from the TV will automatically be loaded.



1 Switch off the TV set.

2 Remove the aerial cable plug from your TV set and insert it into the ⊤⊤ socket at the back of the video recorder.

3 Plug one end of the aerial cable provided into the TV socket on the video recorder and the other end into the aerial input socket on your TV set.

4 Plug one end of the special scart cable provided into the AV1 EXT1 scart socket at the back of the video recorder and the other end into the suitable scart socket on your TV set (see instruction manual TV set).

5 Switch on the TV set.

6 Insert one end of the mains cable into the mains socket ~ at the back of the video recorder and the other end into the wall socket.

☐ The video recorder will automatically load all TV channels stored on your TV, in the same sequence. This may take several minutes.

☐ When the information has been copied, the language selection will appear on the TV screen.

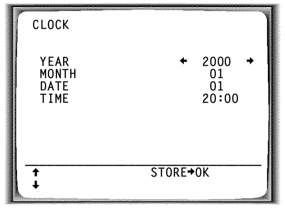
7 select the language for the on-screen display (OSD) with −P↓ or ↑P + and confirm with OK.

The small display on the video recorder can only show english text.

8 Select the country of your residence with –P↓ or ↑P+. If this country does not show up, select 'OTHERS'.

9 Confirm with OK.

☐ Next, 'TIME', 'YEAR', 'MONTH', 'DATE' will appear on the TV screen.



```
CLOCK

YEAR        ← 2000 →
MONTH         01
DATE          01
TIME          20:00

↑
↓           STORE→OK
```

10 Check if the year in line 'YEAR' is correct. Change it if required with the number buttons 0-9 on the remote control.

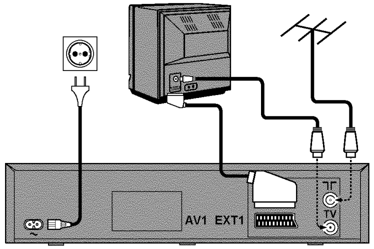
11 Select the next line with ↑P+ or –P↓.

12 Check 'MONTH' and 'DATE', 'TIME' in the same way.

13 When all the information is correct, confirm with OK.

The initial installation is now complete.

Connecting with a scart cable without 'Easy Link'



1 Switch off the TV set.

2 Remove the aerial cable plug from your TV set and insert it into the ⊓⊤ socket at the back of the video recorder.

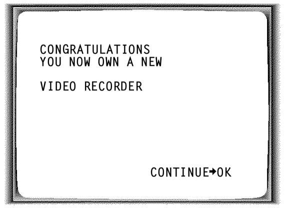
3 Plug one end of the aerial cable provided into the TV socket on the video recorder and the other end into the aerial input socket on your TV set.

4 Plug one end of the scart cable into the AV1 EXT1 scart socket at the back of the video recorder and the other end into the suitable scart socket on your TV set (see instruction manual TV set).

5 Switch on the TV set.

6 Insert one end of the mains cable into the mains socket ~ at the back of the video recorder and the other end into the wall socket.

7 If your TV set **automatically switches** to programme number e.g.: 'EXT', '0', or 'AV', this text will appear on the TV screen:

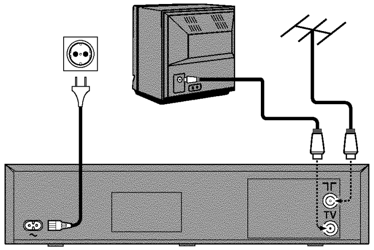


```
CONGRATULATIONS
YOU NOW OWN A NEW
VIDEO RECORDER

          CONTINUE→OK
```

If your TV set does not switch to programme number e.g.: 'EXT', '0', or 'AV' automatically, select the programme number for the video recorder manually (see instruction manual TV set).

8 When the TV has been tuned read the paragraph 'Initial installation' in the chapter 'INSTALLING YOUR VIDEO RECORDER'.

Connecting without a scart cable



1 Switch off the TV set.

2 Remove the aerial cable plug from your TV set and insert it into the ⊓⊤ socket at the back of the video recorder.

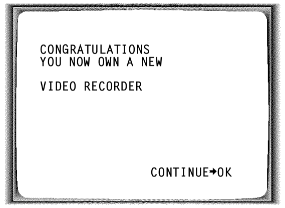
3 Plug one end of the aerial cable provided into the TV socket on the video recorder and the other end into the aerial input socket on your TV set.

4 Insert one end of the mains cable into the mains socket ~ at the back of the video recorder and plug the other end into the wall socket.

5 Switch on your TV set and select the programme number that you have chosen for video playback (see instruction manual TV set).

6 Tune in the TV set until this picture appears.

The video recorder will now transmit on channel 36/ Frequenz 591MHz.



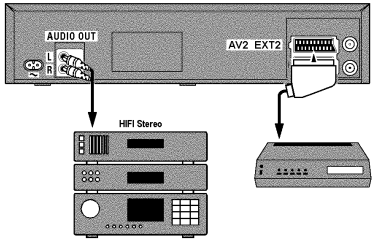
```
CONGRATULATIONS
YOU NOW OWN A NEW
VIDEO RECORDER

          CONTINUE→OK
```

If the picture quality of TV channels on your TV is poor, please read the section 'Reducing picture disturbance - optimizing the modulator' in the chapter 'ADDITIONAL FUNCTIONS'.

7 When the TV has been tuned read the paragraph 'Initial installation' in the chapter 'INSTALLING YOUR VIDEO RECORDER'.

Connecting other equipment

You can connect additional equipment to the AV2 EXT2 socket. For example: a decoder, a satellite receiver or a camera recorder.



2. INSTALLING YOUR VIDEO RECORDER

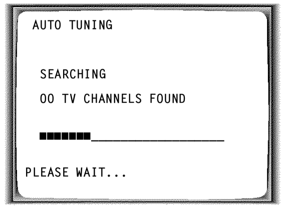
Initial installation

1 Confirm the picture on the TV screen with [OK] on the remote control.

2 Select the language for the on-screen display (OSD) with [−P↓] or [↑P +].
The display on the video recorder will only show english text.

3 Confirm with [OK].

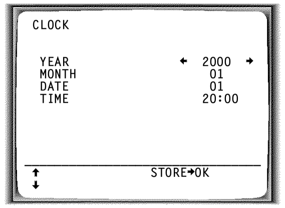
4 Select the country of your residence with [−P↓] or [↑P +].
If this country does not show up, select 'OTHERS'.
Confirm with [OK].
'Automatic TV channel search' starts. This picture will appear on the screen:



```
AUTO TUNING

 SEARCHING

 00 TV CHANNELS FOUND

 ■■■■■■■___________________

PLEASE WAIT...
```

Wait until all TV channels have been found. This can take several minutes.

5 When all TV channels have been found, 'STORED' will appear on the TV screen.
'YEAR', 'MONTH', 'DATE', 'TIME' will appear on the TV screen.



```
CLOCK

 YEAR                  ← 2000 →
 MONTH                    01
 DATE                     01
 TIME                   20:00


↑                   STORE→OK
↓
```

6 Check if the year in line 'YEAR' is correct. Change it if required with the number buttons [0-9] on the remote control.

7 Select the next line with [↑P +] or [−P↓].

8 Check 'MONTH' and 'DATE', 'TIME' in the same way.

9 When all the information is correct, confirm with [OK].
The initial installation is now complete.

▷ If you have connected a satellite receiver, please read the section 'Satellite receiver'.

▷ If you have connected a decoder, you must install it as described in the next section.

▷ If you experience sound distortion or no sound at all with some TV channels, you may have selected the wrong TV system for these TV channels. In the chapter 'Manual TV channel search' you will find the information on how to change the TV system.

Allocating a decoder

Some TV stations will send coded TV channels, that you can only watch when you use a decoder. You can connect such a decoder (descrambler) to your video recorder. With the following function, the connected decoder will automatically be activated for the TV programme you want to watch.

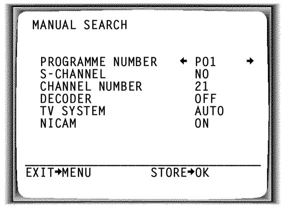
▷ With 'Connecting with scart cable and 'Easy Link' the decoder must be activated for the TV set (see instruction manual TV set).

1 Switch on the TV set. If required, select the programme number for the video recorder.

2 On the video recorder, use [↑P +] or [−P↓] or number buttons [0-9] on the remote control to select the programme number you want to allocate the decoder to.

3 Press [MENU] on the remote control. The main menu will appear.

4 Select the line 'MANUAL SEARCH' with [↑P +] or [−P↓] and confirm with [OK].



```
MANUAL SEARCH

 PROGRAMME NUMBER    ← P01   →
 S-CHANNEL             NO
 CHANNEL NUMBER        21
 DECODER               OFF
 TV SYSTEM             AUTO
 NICAM                 ON


EXIT→MENU         STORE→OK
```

5 Select the line 'DECODER' with [−P↓] or [↑P +].

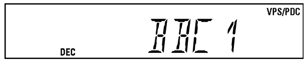
6 Select function 'ON' with [←] or [→].

▷ When you select 'OFF', the decoder will not be allocated.

7 Confirm with [OK].

8 To end, press [MENU].
Your decoder has now been allocated to this TV channel.

▷ When the function is switched on, 'DEC' will appear in the video recorder display for the TV channel you have selected.



Manual TV channel search

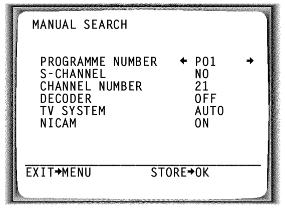
In certain cases the 'Automatic TV channel search' may not be able to find all of the TV channels (e.g. coded TV channels). In that case, use this manual method to set the channels.

▷ With 'Connecting with scart cable and 'Easy Link', this function will start the data transfer.

1 Switch on the TV set. If required, select the programme number for the video recorder.

2 Press [MENU] on the remote control. The main menu will appear.

3 Select the line 'MANUAL SEARCH' with [−P↓] or [↑P +] and confirm with [OK].



```
MANUAL SEARCH

 PROGRAMME NUMBER    ← P01   →
 S-CHANNEL             NO
 CHANNEL NUMBER        21
 DECODER               OFF
 TV SYSTEM             AUTO
 NICAM                 ON


EXIT→MENU         STORE→OK
```

4 Select the line 'PROGRAMME NUMBER' with [−P↓] or [↑P +].

5 Select the desired programme number (e.g.: 'P01') with [←] or [→].

6 In the line 'S-CHANNEL', use [→] to select:
'NO': To enter the channel
'YES': To enter a special channel

7 Enter the channel of the desired TV channel in line 'CHANNEL NUMBER' with the number buttons [0-9].

▷ If you don't know the channel number of the desired TV channel, hold [→] in line 'CHANNEL NUMBER' to start the automatic search.
Repeat automatic search you until have found the desired TV channel. A changing channel number will appear on the TV screen.

8 If you want to allocate a decoder, in line 'DECODER' select 'ON' with [→].

9 This video recorder can receive Hi-Fi sound transmissions in 'NICAM'. However, if sound distortion occurs with poor reception, you can switch 'NICAM' off. To do this, select 'OFF' in line 'NICAM' with [→] or [←].

10 To change the TV system, in line 'TV SYSTEM', select the TV system with [←] or [→].

11 Press [OK] to store the TV channel. 'STORED' will briefly appear on the TV screen.

▷ If you want to search for further TV channels, start again at step 3.

12 To end, press [MENU].

Satellite receiver

You can receive channels from the satellite receiver via the scart socket [AV2 EXT2].
To do this, select programme number 'E1' with [0] on the remote control and then select programme number 'E2' with [−P↓]. You should select the satellite channels on the satellite receiver itself.

Special installation functions

You can select one of the following installation functions in order to adapt the video recorder to your own specific requirements.

Automatic TV channel search

The video recorder will search for all available TV channels.

ⓘ With 'Connecting with scart cable and Easy Link', this function will start the data transfer.

1 Switch on the TV set. If required, select the programme number for the video recorder.

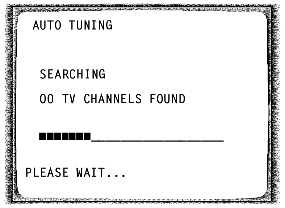
2 Press [MENU] on the remote control. The main menu will appear on the screen.

3 Select the line 'AUTO TUNING' with [−P↓] or [↑P +].

4 Confirm with [OK].

5 Select the country of your residence with [↑P +] or [−P↓].
If your country doesn't show up, select 'OTHERS'.

6 Press [OK]. The 'Automatic TV channel search' starts.



```
AUTO TUNING

 SEARCHING
 00 TV CHANNELS FOUND

 ■■■■■■■___________________

PLEASE WAIT...
```

7 When the TV channel search is complete, 'STORED' will appear on the screen.

8 To end, press [MENU].

How to search for a TV channel manually, you can read in the section 'Manual TV channel search'.

Monitor function

You can switch backwards and forwards between TV picture and video recorder picture with [MONITOR]. But this only works when you use a scart cable to connect the video recorder to your TV set and if your TV set responds to this switch-over.

Sorting and clearing TV channels manually

You can assign any programme number to a TV channel that you have stored and you can also delete unwanted TV channels.

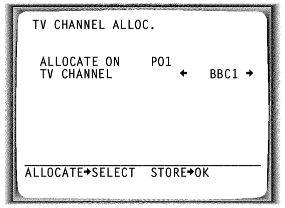
ⓘ With 'Connecting with Easy Link' the video recorder automatically loads the TV channels from the TV set.

1 Switch on the TV set. If required, select the programme number for the video recorder.

2 Press [MENU] on the remote control. The main menu will appear.

3 Select the line 'TV CHANNEL ALLOC.' with [−P↓] or [↑P +].

4 Confirm with [OK].



```
TV CHANNEL ALLOC.

 ALLOCATE ON    P01
 TV CHANNEL         ←  BBC1 →

ALLOCATE→SELECT  STORE→OK
```

5 With [→] or [←], select the TV channel you want to assign a programme number to (starting with 'P01').

ⓘ If you want to delete a TV channel, press [CLEAR (CL)].

6 Confirm with [SELECT]. The following message will briefly appear on the TV screen: e.g.: 'BBC1 ALLOCATED ON P01'.

ⓘ When you have assigned a programme number to the last TV channel, you will automatically return to the main menu when you confirm with [SELECT]. To end, press [MENU].

7 Repeat steps 5 to 6 until you have given a programme number to all TV channels.

8 Confirm with [OK].

9 To end, press [MENU].

Setting the language

You can select the language for the on-screen display (OSD). The small display on the video recorder will only show english text.

1 Switch on the TV set. If required, select the programme number for the video recorder.

2 Press [MENU] on the remote control. The main menu will appear.

3 Select the line 'LANGUAGE' and confirm with [OK].
This will appear in the display: 'STORED'

4 Select your language with [−P↓] or [↑P +] and confirm with [OK].

5 To end, press [MENU].

Setting the time and date

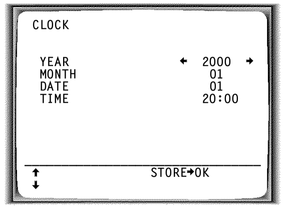
ⓘ If a TV channel which transmits TXT/PDC is stored under programme number 'P01', time and date will automatically be taken from the TXT/PDC information.

If the time in the video recorder display is not correct or if '--:--' appears in the display, please set the clock manually.

1 Switch on the TV set. If required, select the programme number for the video recorder.

2 Press [MENU] on the remote control. The main menu will appear.

3 Select the line 'CLOCK' with [−P↓] or [↑P +] and confirm with [OK].



```
CLOCK

 YEAR              ←  2000  →
 MONTH                 01
 DATE                  01
 TIME                 20:00

↑
↓                 STORE→OK
```

4 Check the year in line 'YEAR'. If required, please change the year with the number buttons [0-9] on the remote control.

5 Select the next line with [↑P +] or [−P↓].

6 Check 'TIME', 'MONTH' and 'DATE' in the same way.

7 When all information is correct, confirm with [OK].
This will appear in the display: 'STORED'

8 To end, press [MENU].

3. IMPORTANT NOTES FOR OPERATION

General information

- You can switch on with STANDBY/ON⏻, the number buttons 0-9 or by putting in a cassette.
- If you have not used the video recorder for a few minutes, it will switch to standby automatically. For more information, please read the section 'Automatic switch-off' in chapter 'additional functions'.
- If you have switched the video recorder off with STANDBY/ON⏻, the time will show in the display, for instance, '18:00'.
  If the clock has not been set, '--:--' will appear.
- When the video recorder is switched off and the time isn't shown in the video recorder display, the clock display may be switched off. You will find more information in the section 'Saving energy'.
- Keep your video recorder connected to the mains at all times to ensure that programmed recordings can be made and that the television works normally.
  Your video recorder uses less than 4 Watt (with clock-display switched off).
- If the video recorder is not plugged into the mains, it will usually store TV channels for a year and timer and date information for three hours.

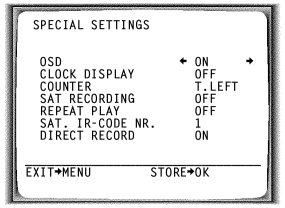
Saving energy

To save energy, you can switch off the clock display on the video recorder. Programmed (TIMER) recordings will take place even if the clock display has been switched off.

1 Switch on the TV set. If required, select the programme number for the video recorder.

2 Press MENU on the remote control. The main menu will appear.

3 Select the line '`SPECIAL SETTINGS`' with −P↓ or ↑P+ and confirm with OK.



```
SPECIAL SETTINGS

 OSD              ← ON     →
 CLOCK DISPLAY      OFF
 COUNTER            T.LEFT
 SAT RECORDING      OFF
 REPEAT PLAY        OFF
 SAT. IR-CODE NR.   1
 DIRECT RECORD      ON

EXIT→MENU        STORE→OK
```

4 To switch off the clock display on the video recorder, select '`OFF`' in line '`CLOCK DISPLAY`' with →.

- To switch the clock display on, select '`ON`'.

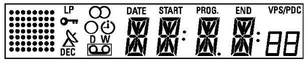
5 Confirm with OK.
'`STORED`' will briefly appear on the TV screen.

6 To end, press MENU.

Emergency interrupt

You can use STANDBY/ON⏻ on the video recorder or the remote control to interrupt any function.
So if you are having operating problems, you can just interrupt the function and start again.
And you can practise operating your set without any worries.
No matter which buttons you press, you cannot damage it.

The symbols on your video recorder display



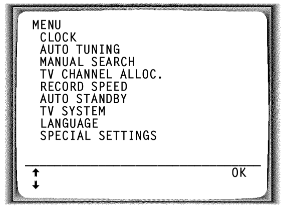
These symbols can light up on your video recorder display:

▦	This is where the current operating mode is shown as a symbol.
LP	When you have switched on the LP (Long Play) function or when you play a tape that has been recorded in LP (Long Play).
🔑	When you have switched on the child lock.
📡	When a satellite recording has been programmed.
DEC	When a decoder has been allocated to the TV channel you have currently selected.
∞	When you play a cassette that has been recorded with hifi sound, or when a hifi sound is transmitted.
○	When you are making a recording.
⏻	When you have programmed a recording or when a programmed recording is being made.
D	When you are programming daily recordings.
W	When you are programming weekly recordings.
📼	When you have put a cassette in the video recorder.
DATE	When the date of the programmed recording is shown.
START	When the start time of the programmed recording is shown.
PROG.	When the programme number of the programmed recording is shown.
END	When the end time of the programmed recording is shown.
VPS/PDC	Video Programming System / Programme Delivery Control: when a VPS or PDC code is being transmitted.
88:88	Display of programme number / tape position / channel name / function.
88	Tape position in seconds, but only if the display mode '`LINEAR`' has been selected.

4. PLAYBACK FUNCTIONS

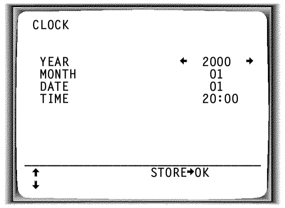
Summary of user guide

The OSD menu offers the following functions. More details on each can be found in the appropriate chapter.



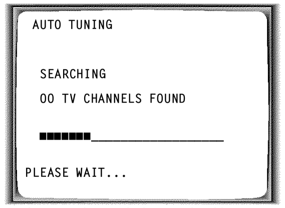
```
MENU
 CLOCK
 AUTO TUNING
 MANUAL SEARCH
 TV CHANNEL ALLOC.
 RECORD SPEED
 AUTO STANDBY
 TV SYSTEM
 LANGUAGE
 SPECIAL SETTINGS

↑                                 OK
↓
```

Main menu



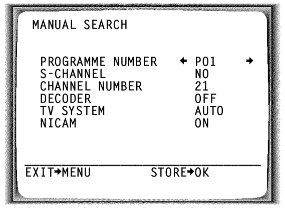
```
CLOCK

 YEAR                ← 2000 →
 MONTH                   01
 DATE                    01
 TIME                 20:00

↑                STORE→OK
↓
```

Chapter: INSTALLING YOUR VIDEO RECORDER - 'Setting the date and the time'



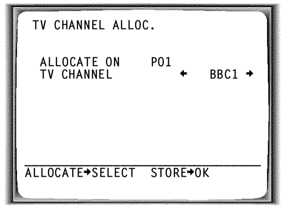
```
AUTO TUNING

 SEARCHING

 00 TV CHANNELS FOUND

 ■■■■■■■__________________

PLEASE WAIT...
```

Chapter: INSTALLING YOUR VIDEO RECORDER - Automatic TV channel search



```
MANUAL SEARCH

 PROGRAMME NUMBER   ← P01   →
 S-CHANNEL            NO
 CHANNEL NUMBER       21
 DECODER              OFF
 TV SYSTEM            AUTO
 NICAM                ON


EXIT→MENU        STORE→OK
```

Chapter: INSTALLING YOUR VIDEO RECORDER - Manual TV channel search



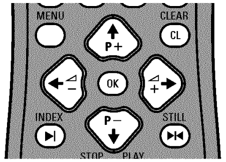
```
TV CHANNEL ALLOC.

 ALLOCATE ON    P01
 TV CHANNEL        ← BBC1 →




ALLOCATE→SELECT  STORE→OK
```

Chapter: INSTALLING YOUR VIDEO RECORDER - Sorting and clearing TV channels manually

User guide (OSD)

The OSD (On-screen display) shows the various functions in the form of a menu on the television screen. You can then choose the settings you require. There is a summary of the menus on this page. The main button functions are displayed in a help line along the bottom of the screen.

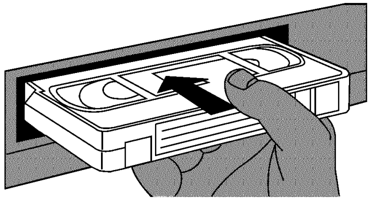
- ☐ **To call up or close the menu:** with MENU.
- ☐ **To select a line:** with −P↓ or ↑P+.
- ☐ **To enter or change your selection:** with the number buttons 0-9 or with ← or →.
- ☐ **To cancel:** with STANDBY/ON⏻.
- ☐ **To save or confirm:** with OK.
- ☐ **To close the main menu:** with MENU.



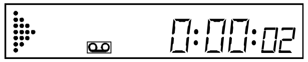
ⓘ The summary of the OSD (On-screen display) menus on this page should help you select the various functions. The OSD text shown on your TV screen may sometimes slightly differ from the OSD text shown on this page.

Playing a cassette

1 Put a cassette into the cassette slot. '📼' will appear on the display.



2 Press the PLAY► button.
This will, for example, appear in the display.



3 To stop, press the STOP■ button.

4 To eject the cassette, press STOP/EJECT■/▲ on the video recorder when the video recorder is in STOP mode.

ⓘ Some hired cassettes may have a poor picture or poor sound quality. This is not a fault in your machine. Please read the section 'Selecting the picture settings (SMART PICTURE)', or 'Picture interference'.

ⓘ Some functions switch off automatically after a while (for example, pause, still picture, picture search). This helps to protect the cassette and avoids wasting power.

ⓘ For playback, the correct recording speed will automatically be selected. Please read the section 'Selecting the recording speed (SP or LP)' in the chapter 'MANUAL RECORDING'.

Playing NTSC cassettes

With this set you can playback cassettes that have been recorded on another video recorder in the NTSC standard (for example, American cassettes). But this only works for PAL-television sets which are suitable for a picture frequency of 60 Hz.

ⓘ When you play an NTSC cassette '60HZ' will appear on the display.

ⓘ Some special features (for example, still picture) are not possible while you are playing an NTSC cassette.

Tape position indication

When playing a tape, by pressing the OK button, you can show the present tape position on the TV screen.

You have a choise of selecting '`LINEAR`' or '`T.LEFT`'.

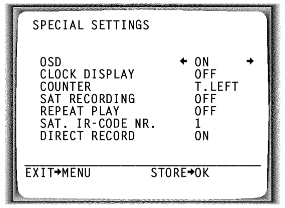
- '`LINEAR`' will show the tape position in hours, minutes and seconds.
- '`T.LEFT`' will show the actual amount of playing/recording time left on the tape in hours and minutes.

ⓘ When you play an NTSC cassette, the video recorder will only show '`LINEAR`'.

1 Switch on the TV set. If required, select the programme number for the video recorder.

2 Press MENU on the remote control. The main menu will appear.

3 Select the line '`SPECIAL SETTINGS`' with ↑P+ or −P↓ and confirm with OK.



```
SPECIAL SETTINGS

 OSD               ← ON      →
 CLOCK DISPLAY       OFF
 COUNTER             T.LEFT
 SAT RECORDING       OFF
 REPEAT PLAY         OFF
 SAT. IR-CODE NR.    1
 DIRECT RECORD       ON

EXIT→MENU        STORE→OK
```

4 Select the line '`COUNTER`' with ↑P+ or −P↓ and confirm with OK.

5 Select '`LINEAR`' or '`T.LEFT`' with ↑P+ and confirm with th OK.

ⓘ The counter '`LINEAR`' will be set to '0:00:00' when you put a cassette in the machine. You can also reset the tape position to '0:00:00' when you press CLEAR (CL).

ⓘ If you rewind a cassette from the tape position '0:00:00', the counter will show for instance, '-0:01:20' (the cassette will be rewound to 1 minute and 20 seconds before '0:00:00').

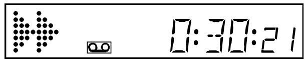
ⓘ If there is an empty space on the tape, the counter '`LINEAR`' will stop running.

▷ The counter type 'T.LEFT' will automatically recognise the length of the tape.
When you put in a cassette the video recorder must first calculate the time played. Therefore, '-:--' appears first and only after the tape has been running for a few seconds the playing time will be shown.

6 To end, press MENU.

Searching for tape position with the picture (picture search)

1 While a cassette is playing, press ◀◀ (reverse) or ▶▶ (forward) once or several times.
This will, for example, appear in the display.

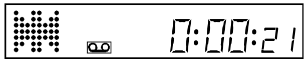


2 To stop a certain place on the tape, press PLAY▶.

▷ During picture search, the picture quality may not be so good and there will be no sound.

Still picture/Slow motion

1 Press STILL▶◀. A still picture will appear on the screen.
This will, for example, appear in the display.



2 Each time you press STILL▶◀ again, the picture will move on one step.

3 When you hold STILL▶◀, the tape will be played in slow motion.

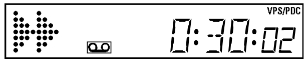
4 When you press ▶▶ several times, you have a choice of several playback speeds.

▷ During slow motion there will be no sound.

Searching for tape position without the picture (wind and rewind)

1 Stop the tape with STOP■.

2 Press ◀◀ (reverse) or ▶▶ (forward).
This will, for example, appear in the display.



3 To stop a certain place on the tape, press STOP■.

Instant View

With this function you can switch to picture search during wind and rewind.

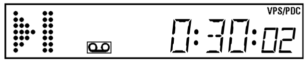
1 If you hold ◀◀ (rewind) or ▶▶ (wind) during wind or rewind, you will switch to picture search.

2 When you release the button, the video recorder will automatically switch back to rewind or wind.

Automatic search for a tape position (index search)

At the start of each recording, the video recorder will write an index code on the tape.

1 Press INDEX▶| and then ▶▶ button to select the next code mark or INDEX▶| and then ◀◀ for the previous code mark.
This will, for example, appear in the display for the next index code.

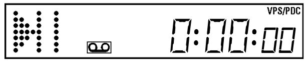


2 When the video recorder finds the code mark, it will automatically switch to play.

Automatic search for a blank space on the tape

You can search for a space on the tape (at least 1 minute of blank tape) for a new recording, for example, after an existing recording on the tape.

1 Press INDEX▶|. Then press STOP■.
This will, for example, appear in the display.



2 When the video recorder find a blank space, it will automatically switch to 'pause'.

▷ If no empty space has been found when the end of the tape is reached, the cassette will be ejected.

Skipping commercials automatically

With this function you can skip 30 sec. on the tape.

1 Press PLAY▶ while the tape is playing.

2 The video recorder will wind the tape 30 seconds and will then switch back to playback.

▷ If the commercial is still on, you can press PLAY▶ again.

▷ If you press PLAY▶ while you are winding the tape, the video recorder will switch back to playback.

Selecting the picture settings (SMART PICTURE)

You can change the picture settings while a tape is playing.

1 Press SMART. This will show the current picture setting.

2 Press SMART again to select the picture settings of your choise.
'NATURAL': for all types of movies (natural picture)
'DISTINCT': for fast movement, sport (detailed picture)
'SOFT': for hired tapes (interference is suppressed)
'SHARP': for cartoons (sharp picture)

▷ These picture settings will not change until you eject the cassette.

Picture interference

If the picture quality is poor when you play a cassette, please follow these instructions.

Tracking during playback

1 While a cassette is playing, hold −P↓ or ↑P+ until the picture quality is at its best.
'TRAC' (tracking) will appear on the display.

2 Wait a few seconds, until 'TRAC' disappears from the display. These picture settings will not change until you eject the cassette.

Tracking during still picture

If the still picture vibrates vertically, you can improve the still picture as follows:

1 During still picture, hold ↑P+ or −P↓ until the picture quality is at its best.
'JITT' will appear in the display.

2 When you release the button, 'JITT' will disappear. The video recorder will store these settings automatically.

▷ Please note, however, that interference may still occur with poor quality cassettes.

5. MANUAL RECORDING

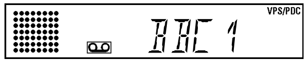
Use 'Manual Recording' to make a spontaneous recording (for example, a programme currently being shown).

- ☐ If you want to start and stop a recording manually, read the section **'Recording without automatic switch-off'**.
- ☐ If you want to start a recording manually but have it stopped automatically, read the section **'Recording with automatic switch-off'**. This is important if you, for instance, don't want to record to the end of the cassette.
- ☐ Read the section **'Direct record'** if you want to record a programme currently being shown.
- ☐ Read the section **'Automatic recording from a satellite receiver'**, if you want a recording to be controlled automatically by a satellite receiver.

Recording without automatic switch-off

1 Insert a cassette.

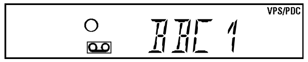
2 Use ↑P + or −P↓ to select the programme number you want to record, for example, 'P01'. This will appear on the display:



▷ When a TV channel transmits a channel name, it will show on the video recorder display.

▷ Programme numbers 'E1' and 'E2' are for recording from other sources (through scart sockets AV1 EXT1 and AV2 EXT2). Programme number 'E3' is for recording from the audio and video front sockets.

3 To start recording, press RECORD ● on the remote control or RECORD ● on the video recorder. This will, for instance, appear in the display.



▷ With OK you can show the tape position in the display.

4 Stop recording with the STOP ■ button.

Recording with automatic switch-off (OTR one-touch-recording)

1 Put a cassette in the machine.

2 Use ↑P + or −P↓ to select the programme number you want to record.

3 Press RECORD ● on the remote control.

4 Each time you press RECORD ● you will add 30 minutes to the recording time.

▷ To cancel this information, press CLEAR (CL) .

Protecting your recordings

So that you don't accidentally delete an important recording, remove the special tab on the narrow side of the cassette with a screwdriver or slide the special tab to the left. Later, if you no longer want to protect your recording, you can seal the gap again with sticky tape or slide the special tab to the right.

Auto-assembling

You can use the auto-assembling function to join individual recordings without any major picture disturbance between them.

1 While the cassette is playing, search for the correct position on the tape.

2 Stop the cassette by pressing STOP ■ . '**II**' will appear in the display.

3 Now start recording as usual by pressing RECORD ● on the remote control.

4 To stop recording, press STOP ■ .

Selecting the recording speed (SP or LP)

You can reduce the recording speed by half. This makes it possible to record, for example, eight-hours instead of four-hours on an 'E240' (four-hour) cassette.

1 Switch on the TV set. If required, select the programme number for the video recorder.

2 Press MENU on the remote control. The main menu will appear.

3 Select the line 'RECORD SPEED' with −P↓ or ↑P + and confirm with OK .

4 Select the required recording speed with ← or → .

▷ 'LP': **L**ong **P**lay = half recording speed (double recording time).
'SP': **S**tandard **P**lay = normal recording speed.
'AUTO': **AUTO**matic Long Play
If there is not enough space on the tape to record a programmed recording in standard speed, the recording will automatically be made in 'LP' (Longplay). Otherwise, the recording speed will be 'SP' (Standardplay).

5 Confirm with OK .

6 To end, press MENU .

▷ The picture quality will be adversely affected when recording at half recording speed ('LP').

▷ For playback, the correct recording speed will automatically be selected.

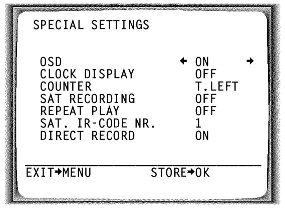
Automatic recording from a satellite receiver (SAT RECORDING)

You can only use this function, when you have a satellite receiver which can control other equipment by a 'programming' function.

1 Switch on the TV set. If required, select the programme number for the video recorder.

2 Press MENU on the remote control. The main menu appears.

3 Select the line 'SPECIAL SETTINGS' with −P↓ or ↑P + , and confirm with OK .



```
SPECIAL SETTINGS

OSD                 ← ON   →
CLOCK DISPLAY         OFF
COUNTER               T.LEFT
SAT RECORDING         OFF
REPEAT PLAY           OFF
SAT. IR-CODE NR.      1
DIRECT RECORD         ON

EXIT→MENU       STORE→OK
```

4 Select the line 'SAT RECORDING' with −P↓ or ↑P + .

5 Select 'ON' with ← or → .

▷ If you want to switch off the function, select 'OFF'.

6 Confirm with OK .

7 To end, press MENU .

8 Put a cassette in the machine.

9 Use a scart cable to connect scart socket AV2 EXT2 on the video recorder to the corresponding scart socket on the satellite receiver.

10 Programme the satellite receiver with the required information (programme number of the TV channel, start time, end time).

▷ The information on how to programme your satellite receiver can be found in the instruction manual of your satellite receiver.

11 Switch off the video recorder with STANDBY/ON ⏻ .

The video recorder is now ready to record. The beginning and end of the recording is controlled via scart socket AV2 EXT2 .

▷ If this function is switched on '📡' will appear on the video recorder display.

'Direct Record'

With this function, the video recorder will automatically record the programme selected on the television by means of a scart cable. **The video recorder must be switched off** .

▷ You can only use this function if your TV is suitable for 'Easy Link'.
This is how you switch the function off:

▷ You will find more information on how to switch 'Direct record' on or off in the next section 'Direct record'.

1 On the TV set, select the programme number you want make the recording from.

2 Press RECORD ● .

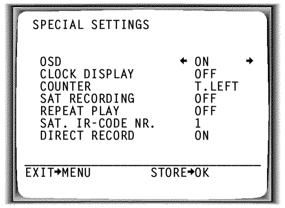
3 If you want to stop recording, press STOP ■ .

Switching 'Direct Record' on or off

1 Switch on the TV set and select the programme number for the video recorder.

2 Press MENU on the remote control. The main menu will appear.

3 Select the line 'SPECIAL SETTINGS' with −P↓ or ↑P+, and confirm with OK.



```
SPECIAL SETTINGS

OSD                 ← ON     →
CLOCK DISPLAY         OFF
COUNTER               T.LEFT
SAT RECORDING         OFF
REPEAT PLAY           OFF
SAT. IR-CODE NR.      1
DIRECT RECORD         ON

EXIT→MENU        STORE→OK
```

4 In the line 'DIRECT RECORD', select the function 'OFF' with ← or →.

- If you select 'ON', the function will be switched on.
- If 'N. ACT.' appears in the line 'DIRECT RECORD', you cannot select the function 'Direct record'.

5 Confirm with OK.

6 To end, press MENU.

7 Switch off with STANDBY/ON⏻.

IR control system with the Sat Mouse

With the Sat Mouse, your video recorder can select broadcastings you receive on your Set Top Box. You will need the Sat Mouse function to programme a TV channel that you can only receive on your satellite receiver. A list of Set Top Boxes that can be controlled with the Sat Mouse is printed at the end of this section.

Connecting your Sat Mouse

1 Connect the Sat Mouse to the IR-SAT socket at the back of your video recorder.

2 Place the Sat Mouse on the Set Top Box and make sure that the infrared signal, which is transmitted from the bottom side of the Sat Mouse, is not blocked.

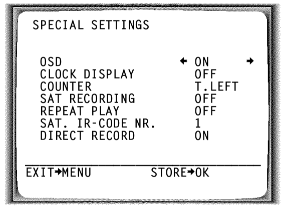
Preparing the IR control system

1 Switch on the Set Top Box and select programme number 1 on your Set Top Box.

2 Switch on the TV set. If required, select the programme number for the video recorder.

3 Press MENU. The main menu appears.

4 Select the line 'SPECIAL SETTINGS' with −P↓ or ↑P+ and confirm with OK.



```
SPECIAL SETTINGS

OSD                 ← ON     →
CLOCK DISPLAY         OFF
COUNTER               T.LEFT
SAT RECORDING         OFF
REPEAT PLAY           OFF
SAT. IR-CODE NR.      1
DIRECT RECORD         ON

EXIT→MENU        STORE→OK
```

5 Select the line 'SAT. IR-CODE NR.' with −P↓ or ↑P+.

6 Enter the IR-code number that corresponds with your Set Top Box, using the number buttons 0-9 on the remote control.

- A list of all available IR-code numbers is printed in the back of this manual.

7 After you have entered the last number, the Set Top Box will automatically switch to programme number 12.

- If your Set Top Box does not switch to this programme number, you can also try any of the other code numbers listed.
- Please also beware, that the IR electronic eye on the Set Top Box is not blocked.

8 Confirm the correct code number with OK.

9 To end, press MENU.

IR-CODE table

TYPE	MODELL	IR-CODE.NR
ASTON	Xena 1500	8,13
CANAL+	Canalsatellite	1
ECHOSTAR	D-2500-IP	11
GRUNDIG	Digibox GDS 200/1	3
HUMAX	F1-AVCI	2
NOKIA	D-BOX	5
NOKIA	9200S	5
NOKIA	9800S	6
NOKIA	9850 T	6
PACE	DTR730 IM	12
PACE	BSKYB 2200	3
PANASONIC	TU-DSB 30	3
PHILIPS	DTX 6371	4
PHILIPS	BCI / 185B / 196	4
SAGEM	ISD 3100	10, 14
SAGEM	ISD 3200	10, 14
TPS	Thomson	10, 14
TPS	Sagem	10, 14
XCOM	CDTV200	7
XCOM	CDTV350	9

6. PROGRAMMED RECORDING (TIMER)

Use programmed recording to automatically start and stop a recording at a later date.

To make a programmed recording, your video recorder needs to know:

* the date you want to make the recording;
* the programme number for the TV channel you want to record;
* the start and stop time of the recording;
* whether you want to use VPS or PDC

The video recorder stores all the information in a TIMER block. You can programme up to 6 TIMER blocks a month in advance.

'VPS' (Video Programming System) and 'PDC' (Programme Delivery Control)

With VPS or PDC, the TV station controls the start time and the length of the recording. This means that the video recorder switches itself on and off at the **right time** even if a TV programme you want to record begins earlier or finishes later than expected.
Usually the start time is the **same** as the VPS or PDC time. But if your TV guide gives a VPS or PDC time which is different to the programme's start time (for example, 20.15 and VPS 20.14), you must enter '20.14' as the start time.
If you want to programme a time that is different from the VPS or PDC time, you must switch off VPS or PDC.

▷ In the United Kingdom, only PDC will be available.

Programming a recording (with 'ShowView')

All the important information needed for a programming is contained in the ShowView-programming number.

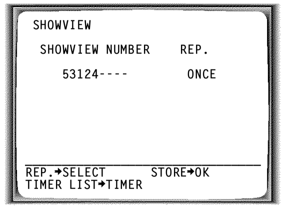
SHOWVIEW® DELUXE

1 Switch on the TV set and select the programme number for the video recorder.

2 Press TIMER ⏻ on the remote control.

3 Enter the entire ShowView programming number (up to 9 digits) printed in your TV guide next to the start time of a TV programme.
For example, 5-312-4 or 5 312 4
Enter 53124 for the ShowView programming number.

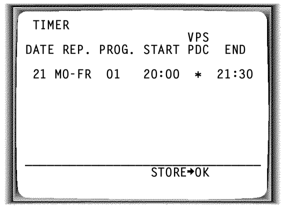
▷ If you make a mistake, you can clear your instructions with CLEAR (CL).



```
SHOWVIEW
 SHOWVIEW NUMBER    REP.
    53124----        ONCE

REP.→SELECT      STORE→OK
TIMER LIST→TIMER
```

4 Use SELECT to select daily or weekly programming.
'ONCE': Recording once
'MO-FR': Recordings every day from Monday to Friday.
'WEEK.': Recordings every week on the same day of the week.

5 Confirm with OK. Your programming details will then appear on the TV screen.



```
TIMER
                           VPS
DATE REP. PROG. START PDC  END
 21 MO-FR  01   20:00  *  21:30

                      STORE→OK
```

▷ If ShowView Deluxe does not recognise the TV channel, 'SELECT PROG. NR.' will appear on the TV screen. Select the desired programme number (or channel name) with the number buttons 0-9 on the remote control and confirm with OK.

▷ If you are using a Sat Mouse and you want to enter a satellite programme number, press SELECT. Make sure that your Sat Mouse has been connected properly (see chapter 'RECORDING', section 'IR control system with the Sat Mouse', 'connecting the Sat Mouse'). Enter the satellite programme number for the TV channel you want to programme with the number buttons 0-9 on the remote control.

▷ If 'SHOWVIEW NUMBER NOT VALID' appears on the TV screen, this means you entered an incorrect ShowView Deluce code number or the incorrect date for the recording. The start of the programmed recording must be within tREACT next 7 days.
Correct your instructions or end with TIMER ⏻.

▷ If 'MO-FR PROGRAMMING NOT POSSIBLE FOR WEEKEND' appears on the TV screen, you have programmed a the wrong day for the daily recording. Daily programming can only be used for recordings to be made from Monday to Friday.

▷ Under 'START', use SELECT to switch 'VPS/PDC' on or off. If '*' appears on the screen, the function has been switched on.

▷ If you have programmed a satellite channel, you cannot use 'VPS/PDC' for this TV channel.

6 Confirm with OK when the information is correct.

▷ The programming information has been stored in a TIMER block.

7 Make sure that the cassette you have put in can be recorded on.

8 Switch off with STANDBY/ON ⏻.
The programmed recording will only function when the video recorder is **switched off** with STANDBY/ON ⏻.

▷ If any of the TIMER blocks are in use, '⏻' will light up on the video recorder display.

▷ While a programmed recording is being made, you cannot operate your video recorder manually. If you want to cancel the programmed recording, press STANDBY/ON ⏻.

▷ If the video recorder is switched on a few minutes before a programmed recording is supposed to begin, 'SWITCH TO STANDBY- TIMER RECORDING' will flash on the TV screen.

▷ If you reach the end of the cassette during a recording, the video recorder will automatically eject the cassette.

▷ If you forget to load a cassette, 'NO CASSETTE' will appear on the TV screen and '⏻' will flash on the video recorder display.

▷ If you have put in a cassette which cannot be used for recording, the video recorder will automatically eject it.

▷ If 'ALL TIMERS OCCUPIED' appears on the TV screen when you press TIMER ⏻, you have used up all the available TIMER blocks. If you want to clear or check a TIMER block, select it with ↑P + or −P↓.

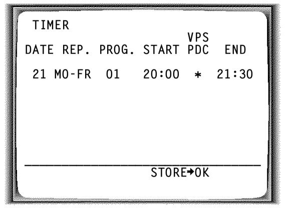
▷ Programme numbers 'E1' and 'E2' are for recordings from other sources (through scart socket AV1 EXT1 or AV2 EXT2).

Programming a recording (without 'ShowView Deluxe')

1 Switch on the TV set and select the programme number for the video recorder.

2 Press TIMER ⏻ on the remote control **twice**. The free TIMER block will be highlighted.

3 Press TIMER ⏻. The information will appear on the screen.



```
TIMER
                           VPS
DATE REP. PROG. START PDC  END
 21 MO-FR  01   20:00  *  21:30

                      STORE→OK
```

4 With TIMER ⏻, → or ← you can select 'DATE' (date), 'PROG.' (programme number), 'START' (start time) and 'END' (end time).
Enter or change your information with ↑P + or −P↓, or with the number buttons 0-9.

▷ Under 'DATE', use the SELECT button to select daily or weekly programming.
'ONCE': Recording once
'MO-FR': Recording from Monday to Friday.
'WEEK.': Recording every week on the same day.

▷ If you are using a Sat Mouse and you want to enter a satellite programme number, press SELECT in line 'PROG.'. Make sure that your Sat Mouse has been connected properly (see chapter 'MANUAL RECORDING', section 'IR control system with the Sat Mouse', 'connecting the Sat Mouse').
On the screen, for instance, 'S---' will appear on the screen. Enter the satellite programme number for the TV channel you want to programme with the number buttons 0-9 on the remote control.

Under 'START', use SELECT to switch 'VPS/PDC' on or off. If '*' appears in the display, 'VPS/PDC' has been switched off. If you have programmed a Set Top Box channel, you cannot use 'VPS/PDC' for this TV channel.

5 Confirm with OK when the information is correct.

The programming information has been stored in a TIMER block.

6 Make sure that the cassette you have put in can be recorded on.

7 Switch off with STANDBY/ON ⏻.
The programmed recording will only function when the video recorder is **switched off** with STANDBY/ON ⏻.

If any of the TIMER blocks are in use, '⏲' will light up on the video recorder display.

While a programmed recording is being made, you cannot operate your video recorder manually. If you want to cancel the programmed recording, press STANDBY/ON ⏻.

If you reach the end of the cassette during a recording, the video recorder will automatically eject the cassette.

If you have put in a cassette that cannot be recorded on, the cassette will be ejected. 'PROTECTED CASSETTE' will briefly appear on the TV screen.

If the video recorder is switched on a few minutes before a programmed recording is to start, 'SWITCH TO STANDBY- TIMER RECORDING' will flash on the TV screen.

If you forget to put a cassette in the machine, 'NO CASSETTE' will appear on the TV screen. '⏲' will flash In the video recorder display.

If 'ALL TIMERS OCCUPIED' appears on the TV screen when you press TIMER ⏲, you have used up all the available TIMER blocks. If you want to clear or check a programmed recording (TIMER block), select it with ↑P + or −P↓.

If 'DATA ERROR' briefly appears on the screen, this means that the TIMER information has not been transferred. Please check date, start time and end time of the programmed recording

Programme numbers 'E1' and 'E2' are for recordings from other sources (through scart socket AV1 EXT1 or AV2 EXT2).

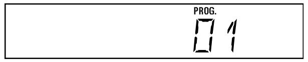
Programming a recording with 'TURBO TIMER'

With the 'TURBO TIMER', programming a recording that takes place within the next 24 hours, will be quick and easy. This preset information will appear in the display:

- Programme number = the programme number selected on your TV
- Start time = current time
- End time = current time + 2 hours

1 Press TURBO TIMER on the remote control.

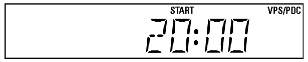
2 Press TURBO TIMER.
The currently selected programme number will appear in the display, for instance, 'PROG. 01'. If required, change the programme number with −P↓ or ↑P +.



If 'CLK' briefly appears in the display, you must set the clock. Please read the section 'Setting the time and date' in chapter 'INSTALLING YOUR VIDEO RECORDER'

If you are using a Sat Mouse and you want to enter a satellite programme number, press SELECT. Make sure that your Sat Mouse has been connected properly (see chapter 'MANUAL RECORDING', section 'IR control system with the Sat Mouse', 'connecting the Sat Mouse'). In the video recorder display '' will appear.
Enter the satellite programme number for the TV channel you want to programme with the number buttons 0-9 on the remote control.

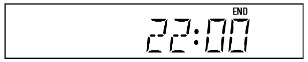
3 Press TURBO TIMER.
The current time (= start time) will appear in the display, for instance, 'START 20:00'. If required, change the start time with −P↓ or ↑P +.



Switch 'VPS/PDC' on or off with SELECT. In the display, 'VPS/PDC' lights up (switched on) or disappears (switched off).

If you have programmed a satellite channel, you cannot use 'VPS/PDC' for this TV channel.

4 Press TURBO TIMER.
The end time will appear in the display, for instance, 'END 22:00'. If required, change the end time with −P↓ or ↑P +.



5 Press TURBO TIMER.
'OK' will briefly appear in the video recorder display. Programming is now complete.

6 Make sure that the cassette you have put in can be recorded on.

7 Switch off with STANDBY/ON ⏻.
The programmed recording will only function when the video recorder is **switched off** with STANDBY/ON ⏻.

If any of the TIMER blocks are in use, '⏲' will light up on the video recorder display.

While a programmed recording is being made, you cannot operate your video recorder manually. If you want to cancel the programmed recording, press STANDBY/ON ⏻.

If you reach the end of the cassette during a recording, the video recorder will automatically eject the cassette.

If you forget to load a cassette, 'CASS' will briefly appear in the display and then '⏲' will flash in the video recorder display.

If you have put in a cassette which cannot be used for recording, the video recorder will automatically eject it.

If 'FULL' appears in the display when you press TURBO TIMER, you have used up all the available TIMER blocks. You can find more information on how to clear or check a programmed recording (TIMER block) in the next chapter.

How to check or change a programmed recording (TIMER)

1 Switch on the TV set and select the programme number for the video recorder.

2 Press TIMER ⏲ on the remote control **twice**.

3 Select the programmed recording (TIMER) you want to check or change with −P↓ or ↑P +.

4 Press TIMER ⏲.

5 Select the entry field with ← or →.

6 Change any information with −P↓ or ↑P + or with the 0-9 number buttons.

7 Confirm with OK.

8 Make sure that the cassette you have put in can be recorded on. Switch off with STANDBY/ON ⏻.

The programmed recording will only function when the video recorder is **switched off** with STANDBY/ON ⏻.

How to clear a programmed recording (TIMER)

1 Switch on the TV set and select the programme number for the video recorder.

2 Press TIMER ⏲ on the remote control **twice**.

3 Select the programmed recording (TIMER) you want to clear with −P↓ or ↑P +.

4 Press CLEAR (CL).
The programmed recording (TIMER) has now been deleted.

5 To end, press MENU.

'NexTView Link'

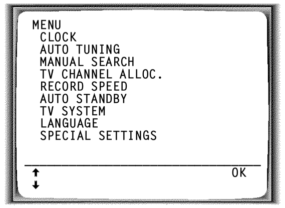
This video recorder is equipped with the function 'NexTView Link'. If your television is also equiped with this function, you can mark TV programmes on the television for programming. These TV programmes will automatically be transmitted to a TIMER block on the video recorder. If you clear the marking of the TV programme on the television, the corresponding TIMER block on the video recorder will also be cleared.
For more information, read the instruction manual of your TV set.

7. ADDITIONAL FUNCTIONS

Switching the TV system

If you play recordings made on another video recorder or if you record from another source, the automatic TV system switch-over may lead to colour distortion.
You can switch off the automatic TV system switch-over as follows.

1 Press MENU on the remote control **before you start recording** or **during playback. The main menu will appear.**



```
MENU
 CLOCK
 AUTO TUNING
 MANUAL SEARCH
 TV CHANNEL ALLOC.
 RECORD SPEED
 AUTO STANDBY
 TV SYSTEM
 LANGUAGE
 SPECIAL SETTINGS

↑                              OK
↓
```

2 Select the line 'TV SYSTEM' with −P↓ or ↑P+ and confirm with OK.

3 Select the TV system with ← or →.
   - Select 'B/W' with → or ← to switch to black and white picture.

4 Confirm with OK.

5 To end, press MENU.

6 If you change the programme number, the video recorder will switch to 'AUTO' (automatic switchover) again.

7 If you eject the cassette, the TV-system for playback will switch to 'AUTO' (automatic switchover) again.

Child lock

This function will prevent unauthorised use of your video recorder. All button-functions will be locked.

- You can make programmed recordings while the child lock is on.

1 With the video recorder switched on, press CHILD LOCK on the remote control for **five seconds**.
'🔑' will appear on the video recorder display.
Keep the remote control in a safe place.

2 If you want to switch off the child lock, press CHILD LOCK again **for five seconds**, with the video recorder switched on.
The symbol '🔑' will disappear from the video recorder display.
   - If you press a button when the child lock is on, the symbol '🔑' will flash on the video recorder display for a few seconds.

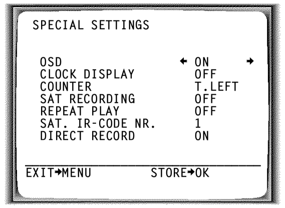
Switching the on-screen display (OSD) off or on

You can switch the on-screen display of the current operating information on or off.
Switching off the on-screen display is necessary if you do not want to record the screen-messages when copying cassettes.

1 Switch on the TV set and select the programme number for the video recorder.

2 Press MENU on the remote control. The main menu will appear.

3 Select the line 'SPECIAL SETTINGS' with −P↓ or ↑P+ and confirm with OK.



```
SPECIAL SETTINGS

 OSD              ← ON    →
 CLOCK DISPLAY      OFF
 COUNTER            T.LEFT
 SAT RECORDING      OFF
 REPEAT PLAY        OFF
 SAT. IR-CODE NR.   1
 DIRECT RECORD      ON

EXIT→MENU      STORE→OK
```

4 In the line 'OSD', select one of the options shown with →.
'ON': Shows the OSD for a few seconds only.
'OFF': Switches off the OSD.

5 Confirm with OK.

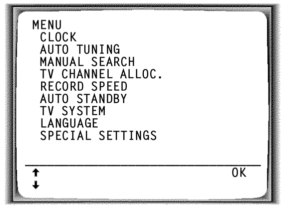
6 To end, press MENU.

Switching the remote control command

If you have two video recorders with the same remote control command, you can change the remote control command of the remote control for one of the video recorders.

1 Switch on the TV set and select the programme number for the video recorder.

2 Press MENU on the remote control. The main menu will appear.



```
MENU
 CLOCK
 AUTO TUNING
 MANUAL SEARCH
 TV CHANNEL ALLOC.
 RECORD SPEED
 AUTO STANDBY
 TV SYSTEM
 LANGUAGE
 SPECIAL SETTINGS

↑                              OK
↓
```

3 On the remote control, press SELECT and button 2 at the same time, to switch the remote control to 'VCR2'.
   - If you want to switch back to 'VCR1', press SELECT and button 1 at the same time.

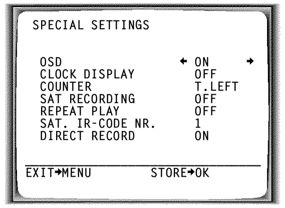
4 Confirm with OK.
If you have switched the remote control and the video recorder to 'VCR2', 'RESPONDS TO VCR2' will appear on the TV screen.
   - If the menu does not disappear, the video recorder didn't recognise the remote control command. Repeat step 3 .
   - If you change the batteries of the remote control, it will switch back to ''.
   - If the message, for example, 'VCR2' appears on the video recorder display, you must switch the remote control to 'VCR2'.

Continuous playback

You can automatically play a cassette again and again. When the video recorder reaches the end of the tape or the end of the recording, it will rewind and start again.

1 Press MENU on the remote control. The main menu will appear.

2 Select the line 'SPECIAL SETTINGS' with ↑P+ or −P↓. Confirm with OK.



```
SPECIAL SETTINGS

 OSD              ← ON    →
 CLOCK DISPLAY      OFF
 COUNTER            T.LEFT
 SAT RECORDING      OFF
 REPEAT PLAY        OFF
 SAT. IR-CODE NR.   1
 DIRECT RECORD      ON

EXIT→MENU      STORE→OK
```

3 Select the line 'REPEAT PLAY' with ↑P+ or −P↓.

4 Select 'ON' with ← or →.
   - If you select 'OFF', continuous playback will be switched off.

5 Confirm with OK.
This will appear on the screen: 'STORED'

6 Press MENU.

7 Put a cassette in the machine.

8 Press PLAY▶ to start continuous playback.

Automatic switch-off

If you haven't used the video recorder for a few minutes in certain modes (e.g.: STOP), it will switch to standby automatically. You can cancel this function to use the video recorder as a television receiver.

1 Switch on the TV set and select the programme number for the video recorder.

2 Press MENU. The main menu will appear.

3 Select the line 'AUTO STANDBY' with −P↓ or ↑P+.

4 Select 'OFF' with ← or →.
   - If you select 'ON', the function will be switched on.

5 Confirm with OK.
This message will briefly appear: 'STORED'

6 To end, press MENU.
   - A **TIMER recording** only works when the video recorder is **switched to standby**.

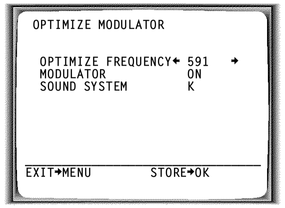
Reducing picture disturbance - optimizing the modulator

You may experience picture disturbance if you have not used a scart cable to connect your video recorder and TV. This is because another TV station in your reception area may already be using UHF-channel CH36 or 591MHz. When the video recorder is switched on, the picture quality of some TV channels received on the TV is poor.
You may optimize the picture quality by changing the modulator frequency (591Mhr or UHF channel 36).

1 Switch on the TV set and select the programme number for the video recorder playback (see your TV operating manual).

2 Make sure that there is **no** cassette in the video recorder.

3 Hold STOP ■ on the remote control and STOP/EJECT ■/▲ on the video recorder at the same time, until, for instance, 'M591' appears in the display.
The video recorder transmits a test picture on UHF-channel 36 or frequency 591mhz.



```
OPTIMIZE MODULATOR

 OPTIMIZE FREQUENCY← 591   →
 MODULATOR           ON
 SOUND SYSTEM        K

EXIT→MENU         STORE→OK
```

4 Select the line 'OPTIMIZE FREQUENCY' with ↑P + or −P↓. Enter the Modulator frequency with the number buttons 0-9.

- Press →. The automatic channel search starts. When the video recorder finds a 'free' channel, the frequency of this channel will be shown in the display.

5 Tune in the TV set to the new modulator frequency shown in the video recorder display.

- If the picture or sound quality is poor, you may have selected the wrong TV system.
  In the line 'SOUND SYSTEM' select the required TV system, for instance, 'G' (for TV-system PAL-B,G) or 'K' (for TV-system SECAM-D,K) using → or ←.

6 Confirm with OK.
'OK' will briefly appear in the video recorder display.

Optimizing the modulator is now complete.

Switching off the modulator

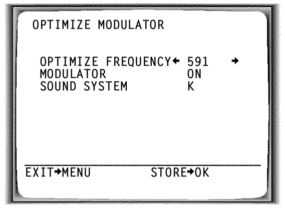
If you cannot clear picture or sound interference, you can switch off the built-in modulator. You can only switch off the modulator if you have connected the video recorder to the TV set with a scart cable. 'Connecting VCR without scart cable' is not possible when the modulator is switched off.

- With the function 'Connecting with scart cable and Easy link' the modulator will be switched off automatically.

1 Switch on the TV set and select the programme number for the video recorder.

2 Make sure that there is **no** cassette in the video recorder.

3 Press STOP/EJECT ■/▲ on the video recorder and STOP ■ on the remote control **at the same time** for several seconds, until, for example, 'M591' appears on the video recorder display.



```
OPTIMIZE MODULATOR

 OPTIMIZE FREQUENCY← 591   →
 MODULATOR           ON
 SOUND SYSTEM        K

EXIT→MENU         STORE→OK
```

4 Select the line 'MODULATOR' on the TV screen or 'MOD+' in the display with ↑P + or −P↓.

5 With ←, select the function 'OFF' on the TV screen or 'MOD-' (modulator off) in the display.

- If you want to switch the modulator on again, select 'MOD+' (modulator on) in the video recorder display with ←.

6 Confirm with OK.

7 To end, press MENU.

Using your video recorder remote control with your TV set

Your video recorder remote control can transmit several commands to TV sets of different makes.
By using the **TV** buttons on the panel in the middle of the control, you can:

◿+	increase the TV volume
◿−	reduce the TV volume
TV🔇	switch off sound
TV⏻	switch off the TV set
TV+	next programme number
TV−	previous programme number

1 Hold TV⏻ and enter the correct remote control command with the number buttons 0-9.
You will find a list of all available remote control commands on the last page of this manual.

- If the selected code does not work with your TV set, or if the make of your TV is not in the list, you can try out the codes one after the other.

8. Before you call an engineer

If, contrary to expectation, you have any problems using this video recorder, it may be caused by one of the reasons mentioned below. You can also call the **customer service centre** in your country.
You will find the phone number in the enclosed guarantee leaflet. Be prepared to give the model and production number to the customer service. Have the model number (MODEL NO) and the production number (PROD.NO) of your video recorder ready.

Your video recorder does not respond to any button being pressed:

- There is no power supply: check the power supply.
- A programmed recording is currently being made: if desired, cancel the programmed recording with STANDBY/ON ⏻ .
- Child lock is on: switch the child lock off.
- There is a technical problem: switch off the mains power supply for 30 seconds, then switch it on again. If this does not have any effect, you can:
  1. Switch off the mains power supply again.
  2. Then switch it on **whilst holding down** STANDBY ⏻ on the video recorder.
  3. Release the button when 'OSD' appears in the video recorder display. All the information stored (TV channels, time and date, TIMER) will be cleared.

Cassette is jammed in the video recorder:

- Don't use force. Pull out the mains plug for a moment.

Remote control does not work:

- Remote control not pointed toward the video recorder: point it at the video recorder.
- There is a technical problem: Take out the batteries, wait for 10 seconds and place them back.
- Batteries have run out: change the batteries.
- The remote control command is wrong: read 'Switching remote control command' in the chapter 'Additional functions'.

No picture when you play a cassette:

- There is no recording on the cassette: change the cassette.
- You have selected the wrong programme number on the TV for playing cassette: on the TV, select the correct programme number for the video recorder.
- The cable connecting the TV set and the video recorder has come loose: check the cable.

Poor picture quality when you play a cassette:

- Your TV set is not properly adjusted.
- The cassette badly worn or of poor quality: use new cassette.
- Tracking is not properly adjusted: turn to chapter 'PLAYBACK FUNCTIONS' and read the section 'Tracking during playback'.
- Read the section 'Selecting the picture settings (SMART PICTURE)' in the chapter 'PLAYBACK FUNCTIONS'.

The video recorder will not record:

- The TV channel you want to record is not stored or you selected the wrong programme number: check TV channels stored.
- You have loaded a cassette which cannot be recorded on: undo the erase protection on the cassette.

Programmed recording does not work:

- You have not set the TIMER properly: check the TIMER blocks.
- You have programmed the wrong time or date: check time and date.
- You have put in a cassette that cannot be recorded on: undo the erase protection on the cassette.
- 'VPS/PDC' switched on but 'VPS/PDCtime' wrong: enter 'VPS/PDCtime exactly to the minute. Have your aerial checked.
- You have programmed a recording with ShowView Deluxe, but the programme number information of the TIMER block is not the programme number you want to record from:
  1. Confirm the ShowView programming number with OK .
  2. Press TIMER ⏲ .
  3. Change the programme number displayed in the 'PROG.' entry field.
  4. Confirm with TIMER ⏲ .

There is picture or sound interference on TV reception:

- Turn to chapter 'ADDITIONAL FUNCTIONS' and read 'Reducing picture disturbance - optimizing the modulator' and 'Switching off the modulator'.
- Have your aerial checked.

9. GLOSSARY

Technical terms used

Current tape position

The part of the tape currently being played.

External source

A device connected via a socket (for example, scart socket) which is transmitting audio/video signals to the video recorder.

Index marking

A marking which is automatically made on the tape at the beginning of every recording. This marking (recording ID) can be searched for with the Index search function.

Scart cable

Also known as a Euro-AV cable. This standard cable is an easy method of connecting various audio and video devices, computer screens and televisions. Other signals in addition to audio and video signals can be transmitted on it.

TV system

There are various systems for transmitting television signals, for example, PAL, SECAM, PAL BG, SECAM DK, SECAM L/L, NTSC etc. The system used by your television depends on which country you are in.

TXT

Also known as Teletext, Fasttext, Videotext, FLOF etc.

OTR

One touch recording (to start recording by pushing just one button). This function enables you to select the switch-off time in intervals of 30 minutes.

Modulator

An electronic component in a video recorder which allows audio and video signals to be transmitted via the aerial cable. Your television receives the signal in the same way as a signal from a television station.

Modulator channel or frequency

This frequency or channel indicates the frequency or channel on which the audio or video signal is transmitted.

UHF frequency range

Channels 21 to 69. The video recorder 'broadcasts' on channel 36/frequency 591 MHz. This frequency or channel can be changed. See the section 'Reducing picture disturbance - 'optimizing the modulator'.

OSD (On-screen display)

The largest possible display area for the video recorder - the screen on your television set.

Remote codes

Acura	02
Adyson	05, 20
Akai	18, 33
Akura	21, 25
Alba	02, 07, 21
Allorgan	28
Amplivision	20
Amstrad	02
Anitech	02
Arcam	19, 20
Asuka	21
Audiosonic	15
BPL	26
BSR	28
BTC	21
Basic Line	02, 21
Baur	03, 33
Beko	35
Binatone	20
Blaupunkt	17
Blue Sky	21
Blue Star	26
Bondstec	23
Boots	20
Brandt	15
Britannia	19
Bush	02, 07, 21, 26, 28, 36
CGE	23
CS Electronics	19
CTC	23
Carrefour	07
Cascade	02
Cimline	02
Clatronic	23, 35
Condor	30, 35
Contec	02, 07, 19
Crown	02, 35, 38
Cybertron	21
Daewoo	02, 36
Dainichi	21
Dayton	02
De Graaf	18
Decca	10
Dixi	02
Dual Tec	20
Elite	21, 30
Elta	02
Emerson	33
Ferguson	15
Fidelity	19, 33
Finlandia	18, 32
Finlux	10, 13, 32
Firstline	02, 19, 20, 23, 28, 31
Fisher	18, 20, 35
Formenti	30
Frontech	23, 25
Fujitsu	10
Funai	25, 28
GEC	10, 20
GPM	21
Geloso	02
Genexxa	21
GoldStar	15, 20, 27
Goodmans	07, 10, 20, 29, 36
Gorenje	35
Graetz	33
Granada	10, 18, 20
Grandin	26
Grundig	17
HCM	02, 26
Hanseatic	01, 30, 33
Hinari	02, 07, 21
Hisawa	26
Hitachi	05, 07, 08, 13, 15, 20, 22
Huanyu	19, 36
Hypson	25, 26
ICE	20, 25
ICeS	21
ITT	33
Imperial	23, 35, 38
Inno Hit	10
Interfunk	23, 33
Intervision	12, 20, 25
Isukai	21
JVC	07, 09
Kaisui	02, 19, 20, 21, 26
Kathrein	01
Kingsley	19
Koyoda	02
Leyco	10, 25, 28
Lloytron	05
Luxor	33
M Electronic	02, 13, 15, 20, 32, 36, 41
Magnadyne	12, 23
Magnafon	12
Manesth	20, 25, 30
Marantz	01
Matsui	02, 04, 06, 07, 10, 18, 20, 28
Memorex	02
Metz	34
Mitsubishi	07, 14, 16
Mivar	19, 27
Multitech	02, 12, 19
Neckermann	01
Nikkai	05, 06, 10, 19, 21, 25
Nobliko	12
Nokia	33, 41
Nordmende	15
Oceanic	33
Orion	28, 30, 31
Osaki	05, 10, 20, 21, 25
Oso	21
Osume	05, 10
Otake	29
Otto Versand	01, 03, 07, 20, 30
Palladium	35, 38
Panama	20, 25
Panasonic	24, 34
Pathe Cinema	19, 30
Pausa	02
Perdio	30
Phase	05
Philco	23
Philips	01, 36
Pioneer	15
Profex	02, 33
Proline	31
Protech	02, 12, 20, 23, 25, 38
Quelle	03, 04, 33
Questa	07
Rank Arena	07
Rediffusion	33
Rex	25
Roadstar	02, 21, 25, 38
SEG	07, 20, 25
SEI	12, 28
Saba	15
Saisho	02, 04, 25
Salora	33
Sambers	12
Samsung	01, 02, 20, 25, 27, 35
Sandra	19
Sanyo	04, 07, 10, 18
Schaub Lorenz	33
Schneider	21, 23, 37
Sei-Sinudyne	03
Sentra	06
Sharp	07, 11
Shorai	28
Siarem	12
Siemens	17
Silver	07
Sinudyne	12, 28
Solavox	05
Sonitron	18
Sonoko	02
Sonolor	18
Sony	03, 04, 07
Soundwave	38
Standard	02, 20, 21
Sunkai	28, 31
Susumu	21
Tandy	10, 20, 21
Tashiko	07, 20
Tatung	10, 20
Tec	20, 23
Technema	30
Technics	24
Telefunken	15
Telemeister	30
Teletech	02
Teleton	20
Tensai	21, 28, 29, 30
Texet	19, 21
Thomson	15
Thorn	06, 10, 33
Tomashi	26
Toshiba	06, 07
Uher	30
Ultravox	12
Universum	13, 25, 32, 35
Videosat	23
Videotechnic	20
Visa	02
Vision	30
Waltham	20
Watson	30
Watt Radio	12
Wega	07
White Westinghouse	19, 30
Yoko	20, 25

4. Dismantling instructions

4.1 Dismantling instructions

General guidelines for dismantling housing components, electronic parts and the drive mechanism

Always disconnect from mains before dismantling or assembly.

Due to the supply voltages (hot circuit) on the primary side of the switched-mode power supply, an isolating transformer is required for the operation of the device.

The drive or the drive/motherboard unit must not be pulled out by the cross struts!

Components placed below the tape deck has to be inserted exactly.

The use of a regulating isolating transformer is recommended for detecting faults around the power supply.

All screws of the video recorder can be removed or tightened with a 10* torx screwdriver .

1. Housing cover (Figure 4-1)

– Remove the four screws (A).
– Push catch (S) inwards, lifting lid at the same time to move out of groove.
– Slide housing cover back by approx. 1 cm.
– Push centre of housing cover sides on underside approx. 1 cm outwards and lift up the housing cover.

Assembly
Assemble in reverse order.

2. Base plate (Figure 4-2)
The base plate may not be removed from the frame!

3. Front panel (Figure 4-2)

Preparation
Dismantle the housing lid as described in section 1.

– Position the device with the base plate facing upwards.
– Undo the six catches (S) one after the other, starting from the left or the right.
– Remove the front panel by pulling it forwards.
– For devices with shuttle print or socket print, disconnect the cabling to the motherboard.

Assembly
Assemble in reverse order (device in operational position).

Important

– The lift flap lever should be connected to the lift flap guide.
– Check that all catches are engaged.

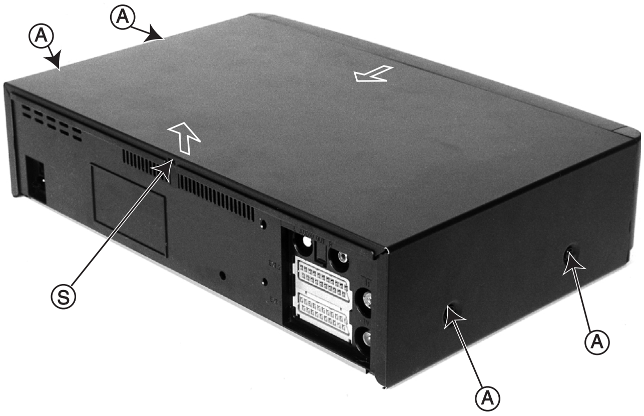


Figure 4-1

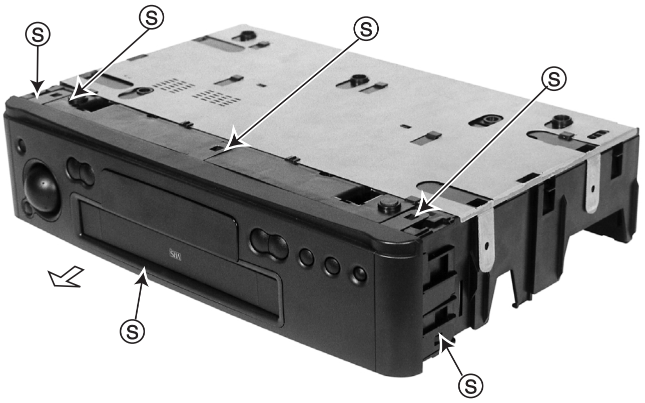


Figure 4-2

4.2 Dismantling of the motherboard/drive combination (Figure 4-3 and 4-4)

Preparation
Remove the housing cover as described in section 1.
Remove the front panel as described in section 3.

- Move device into operational position (Figure 4-3).
- Undo the two screws (B) of the stay and pull it up to remove it.
- Push back the lift by 5 cm after releasing both lift stops.
- Undo and remove the four fastening screws (C) of the drive.
- Detach the Cinch socket cable (K) and ground cable (M) from the socket print (if present).
- Remove the cables (K1; K2; K3) from the guides on the rear of the frame.
- Pull the Cinch socket holder with the socket and print up and out of the frame (if present).
- Position the device with the base plate facing up.
- Undo the 8 catches (S) from the rear right to the rear front and then from the rear left to the front left.
- After the weight of the motherboard/drive unit has released it from the frame, the catch (S) at the mains socket has to be released for a second time.
- The frame can be removed by lifting it off.
- Turn the motherboard/drive unit and move it into the service position (Figure 4-6), if necessary.
- The device is operational in this position

”Eject” must NOT be used !!!

Caution:
Adjustments can not be made in the service position.
”Eject” must NOT be used !!!

Assembly
- Position the frame with the top open onto a level surface.
- Hold the drive on the side at the lift and insert the motherboard/drive unit into the frame, pushing it down lightly. Observe that the power Supply and Scart sockets are positioned in openings.
- Check that all 8 catches (S) are engaged.
- Secure the drive with the four holding screws (C).
- Move the lift into the ”Eject” position.
- Push the stay onto the frame with the chamfered side facing to the rear and secure with both screws (B).
- Insert the Cinch socket into the opening and ensure that it engages.
- Connect the Cinch socket and the ground cable (K ; M) (if present).

- **Insert the cables (K1; K2; K3) into the supports provided in the frame.**

- Replace the front panel and the housing cover.

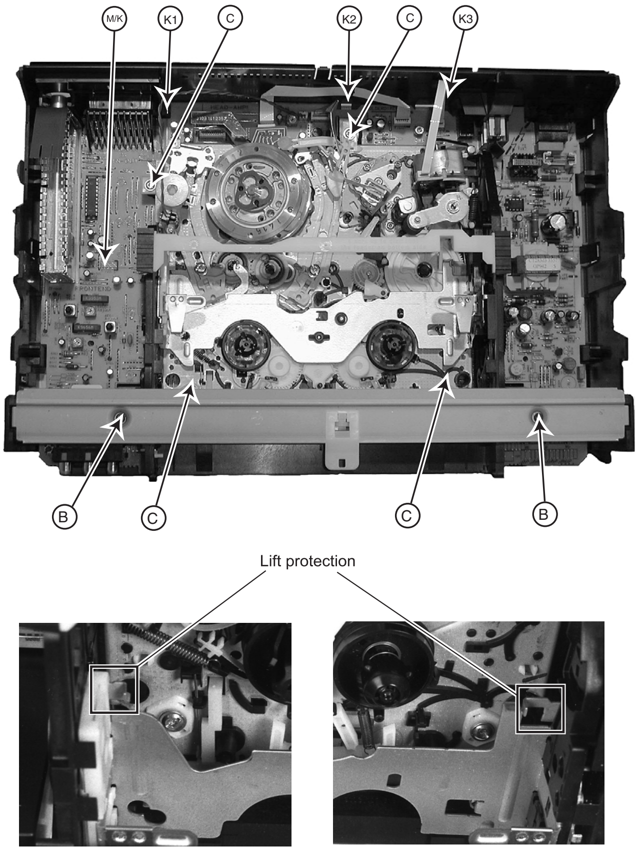


Figure 4-3

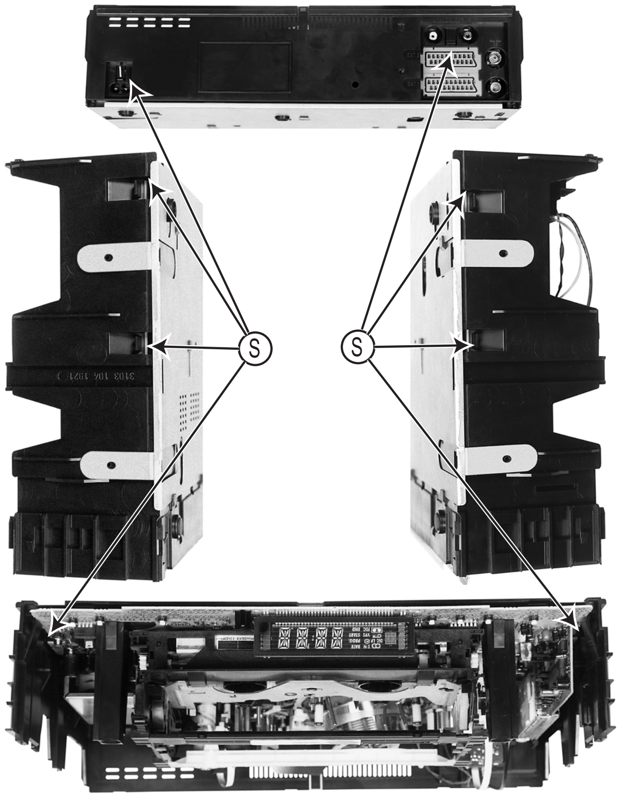


Figure 4-4

4.3 Dismantling the drive (Figure 4-3, 4-5 and 4-6)

Preparation
Remove the housing cover as described in section 1.
Remove the front panel as described in section 3.

- Undo the two screws (B) of the stay and pull it up to remove it.
- Push back lift by 5 cm after releasing both lift stops.
- Undo and remove the four fastening screws (C) of the drive.
- Undo and remove the ground screw (D) at the rear.
- (For this purpose, insert the screwdriver through the hole in the back panel).
- Remove the cables from the drive.
- Bend back the guard of the scanner cable.
- Remove the scanner cable from the socket.
- Return the lift into the ”Eject” position.
- Slightly lift the left rear side of the drive to undo the connector to the capstan motor.
- Press both catches (S) together with fine pliers and lift the drive around the snapholders.
- The drive may be separated from the motherboard.

Assembly
Assemble in reverse order.

Important
Observe that the cables (K1; K2; K3) are positioned in the supports on the rear of the frame and that the ground screw (D) is screwed in!

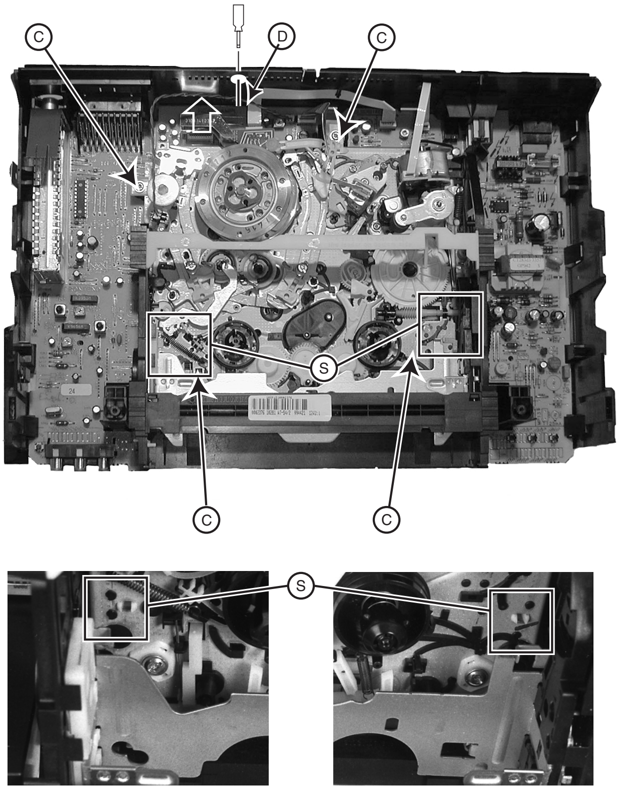


Figure 4-5

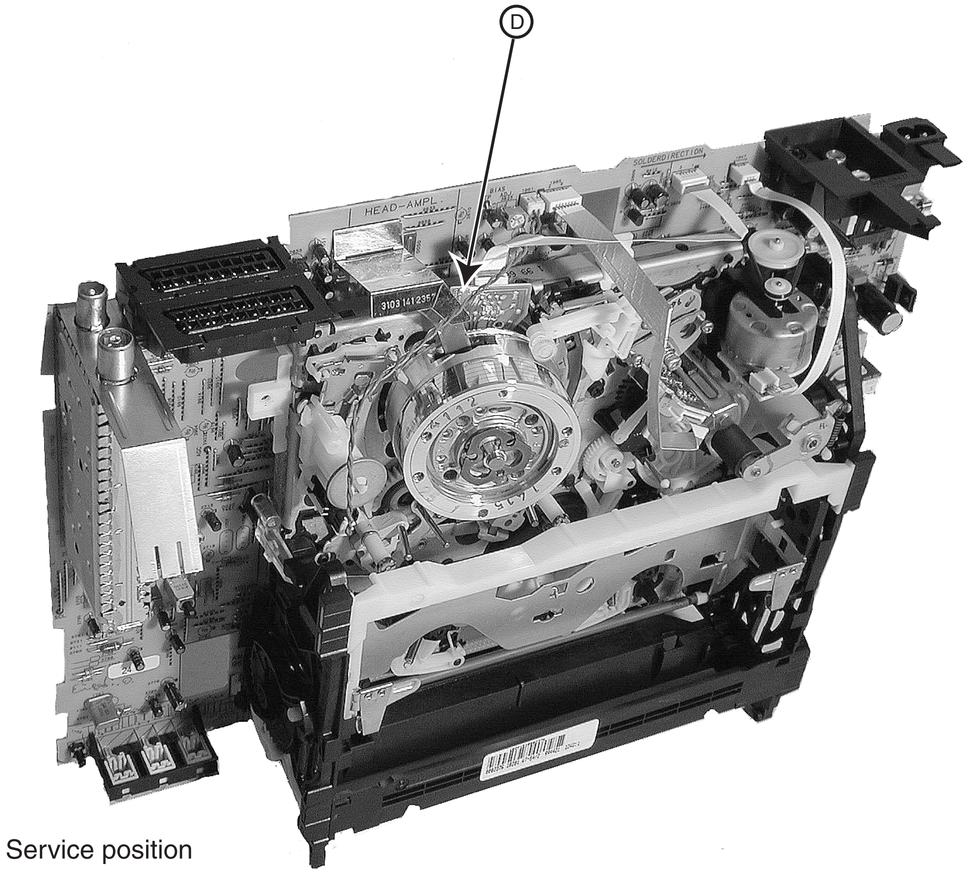


Figure 4-6

5. Service modes, Repair tips

5.1 Special functions

5.1.1 Erasing the EEPROM

- Disconnect from mains
- Push and hold down the Standby key, reconnect to mains and keep the Standby key depressed for a further 3 sec.

All EEPROM data will then be erased and initialised (timer and transmitter channels). The internal processor RAM will also be erased, but the option codes, deck parameters and adjustment values are maintained.

5.1.2 After changing the EEPROM or Motherboard the following steps must be carried out:

Step 40: Option code input
Step 51: Gap position adjustment
Step 52: Studio Picture control‘ adjustment
Step 53: Input of clock correction
Step 62: Adjustment of Audio Linear Playback Level
Step 99: Clock frequency output

5.2 Service test program

5.2.1 Introduction

The software program for the control, deck and operating microprocessors includes a service test program. It was divided into the following steps, with the following ‘modes‘:

Step 00: Display of mask version number
Step 01: Check of the drive positions
Step 02: Display of the deck - error codes
Step 03: Deck - sensors and manual tracking
Step 04: Display of operating hours counter
Step 05: Display of the IIC-Bus Communication
Step 10: Operation without drive - dummy mode
Step 40: Option code input

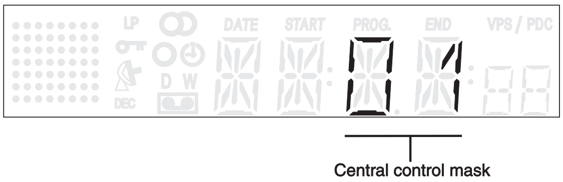
Adjustment Steps in the service test program:
Step 51: Gap position adjustment
Step 52: ‘Studio Picture control‘ adjustment
Step 53: Input of clock correction
Step 62: Adjustment of Audio Linear Playback Level
Step 98: Display test
Step 99: Clock frequency output

In the service test program, all drive functions apart from the channel search and channel change mode can be carried out. The program position set before entering the service test program is maintained.

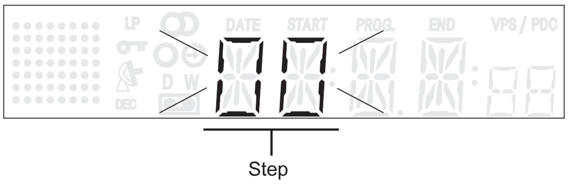
5.2.2 Activating the service test program

Press and hold down the STOP key on the remote control. Then press the PLAY key on the recorder and keep it depressed for at least 5 sec. The STOP key on the remote control may be released whilst the PLAY key on the recorder is pressed.
The service test program can be selected in any operating mode apart from the channel search, install, clock set-up and cassette length calculation mode. The recorder and all drive functions are fully operational in the service mode.

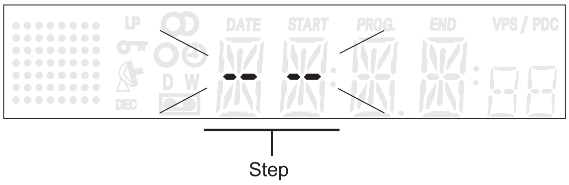
The display shows, for instance:



By pressing the SELECT key on the remote control, all step modes may be left and the currently selected step number appears and flashes.



Other service steps are selected with the UP and DOWN keys or the numerical remote control keys. By pressing the SELECT key on the remote control whilst the Step is flashing, the respective mode can be entered or left.
If a step is selected to which no mode is assigned, the displays shows - - and flashes.

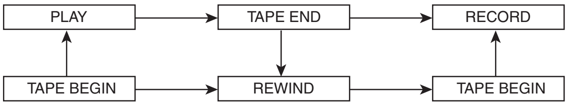


To leave the service program, press the STAND-BY key or disconnect recorder from mains.

5.2.3 Service mode functions

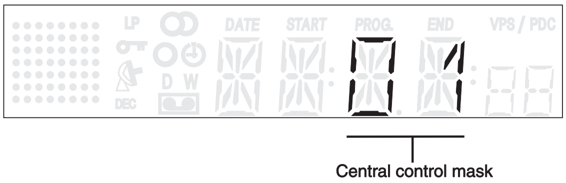
Endurance test
In the service test program, the recorder can be endurance tested. For this purpose, use a cassette and activate “PLAY” or “REC”. The functions are then repeated continuously. In RECORD, the recorder does not move to EJECT at the tape end, but to REWIND, after which it starts to RECORD again. This test serves to detect intermittent faults. The last error is stored in the EEPROM. (The fault remains stored even after a power failure).

The endurance test is ended by pressing STOP or leaving the service test program.

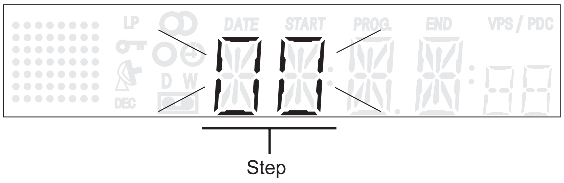


5.2.4 Description of steps with modes:

Step 00: Display of mask version number
After activating the service test program, step 00 and the mask version number are automatically displayed.



The mode can be left again by pressing the SELECT key on the remote control. The currently selected position number appears and flashes on the display.



A step between 00 and 99 can now be selected

Step 01: Checking the drive positions
By pressing the SELECT key whilst Step 01 is flashing, the drive position appears on the display.
The FTA signal from the photoelectric barriers which controls the revolutions of the loading motor is used to check the drive condition.
The drive position is shown as a 3-digit decimal number by counting the FTA pulses on the display.

(e.g. 213 = Play)

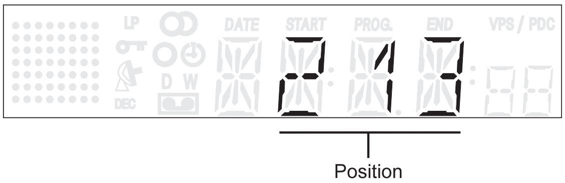
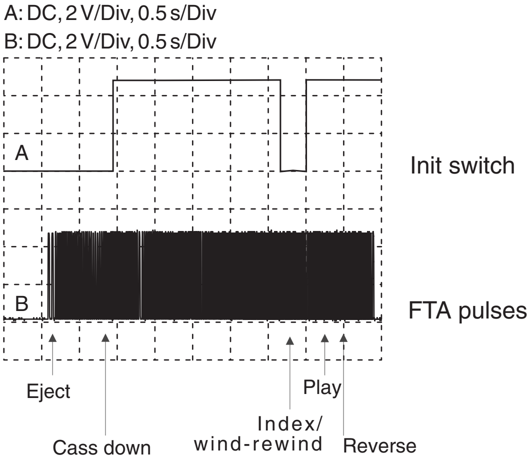


Table of drive positions:

Status	Position (FTA dec)
Eject	007 +2/-2
Index	191 +0/-2
Stop	200 +4/-4
Play	213 +4/-4
Reverse	237 +2/-0

Function of the Init switch:
The diagram shows the function of the Init switch, depending on the position of the deck. The number of FTA pulses is important for the position of the drive.



Step 02: Display of the deck error codes
By pressing the SELECT key whilst Step 02 is flashing, the deck error code is shown on the display.

Checking the drive function
Loading and unloading time
The signal (FTA) of the photoelectric barrier which controls the revolutions of the loading motor is used as a reference for the loading and unloading time.

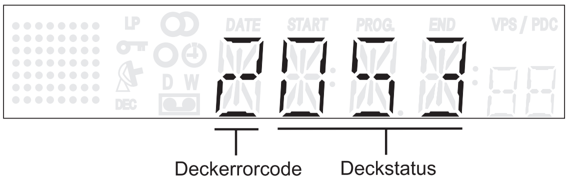
Stopping of supply or take-up reels
The tacho signals of the left (WTL) and right (WTR) winding disks are used as control reference.

Stopping of head drum motor
This is monitored with the PG/FG signal. The signal is discharged from the e.m.f. of the non-conducting spools of the head cylinder motor, showing the position of the head cylinder.

Capstan motor fault
This is monitored with the FGD signal.
If one of the above sensor signals is not available, the recorder tries to put the lift into the “EJECT” position.

Explanation of deck error codes and deck error status
The last error code is stored and remains in the EEPROM, even if the recorder is disconnected from the mains.
The error code can be erased by pushing the CLEAR button on the remote control.

The display shows, for instance:



The left digit shows the error:
(e.g.: Error 2 = Capstan error)

Error table:

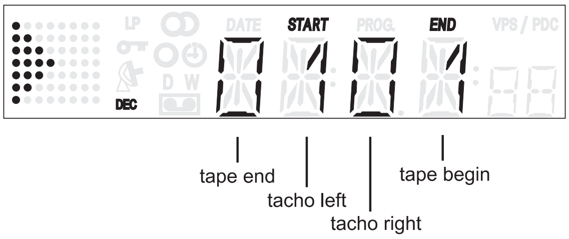
0	no error
1	threading error
2	no capstan pulses
3	tape broken
4	no pulses left reel
5	no pulses right reel
6	head motor error

The 3 digits on the right represent the deck error condition:
(e.g.: 053 = during Play)
The error code can be reset in this step with the CLEAR key.

Functiontable:

012	Standby	114	VISS write	211	Slowmotion 1/24
014	Autotracking	115	Viss erase	212	" " 1/14
031	Play-3	125	Tuner - Stopout	215	" " 1/7
034	Slow_reverse	126	Auto Remain Funct.	216	" " 1/2
041	Still Picture	130	ATTS Function	217	" " -1/24
042	Fast	168	Frame+	218	" " -1/14
044	Play-9	169	Frame-	219	" " -1/7
045	Eject	170	Play-11	220	" " -1/2
046	Play9	171	Play-7	222	Edit Record
047	Play-1	172	Play-5	223	Align of Gap
048	Pause	173	Play5	238	Pause
050	Rewind	174	Play7	239	SPC align
052	Wind	175	Play11	246	Edit Pause
053	Play	196	Tuner - Eject	247	Slow motion 1/10
054	Stop out	197	Standby Eject	248	" " 1/18
055	Record	199	Audio Dubbing	249	" " -1/10
112	Index next	202	Audio Dubb. Pause	250	" " -1/18
113	Index previous	206	Reset Tapecounter	253	Key Released

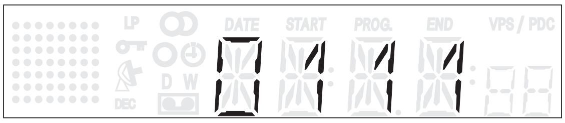
Step 03: Deck sensors and manual tracking
By pressing the SELECT key whilst step 03 is flashing, the deck sensors will be displayed in one digit as either 1 or 0.



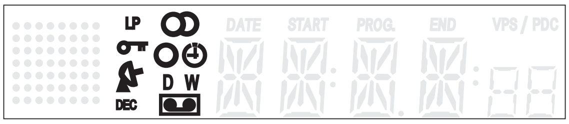
■ ● ◀ ▶	are used to display the deck status
START	init switch (INIT)
END	record protection (RECP)
DEC	Loading pulses (FTA)

In the service test program, the tracking is always in the centre position.
Only in this step can the value for the required tape running setting be changed, manually in the PLAY function with the UP / DOWN keys. After leaving the mode with the SELECT key, the tracking value always resets itself to the centre position and cannot be changed.

Step 04: Display of the operating hours counter:
By pressing the SELECT key whilst step 04 is flashing, the operating hours counter shows how many hours the head disk has turned. The hours are displayed as a 4-digit decimal number.



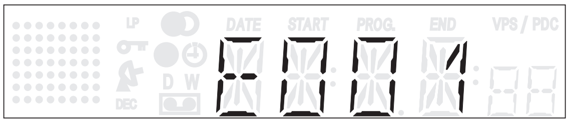
Step 05: Display of the IIC - Bus Communication:
By pressing the SELECT key whilst step 05 is flashing, the available IIC- components will be displayed with symbols.



Symbol	Description	Component	Position
📼	VPS or VPO IC	SDA5650 or SDA5652	7502
DEC	FM ST / NIC IC	MSP 3415D	7761
📡	FM St IC	TDA 9873	7760
W	Video switch IC	STV 6401	7904
D	FM Audio IC	TDA 9605H	7650
⏲	Tuner Philips	TP9xx	1701
O	Tuner Alps	TMRxx/TCBZ4	1701
🔑	Modulator Phil	TP9xx	1701
LP	Modulator Alps	TMRxx/TCBZ4	1701
∞	Signal electr. IC	LA71595M	7004

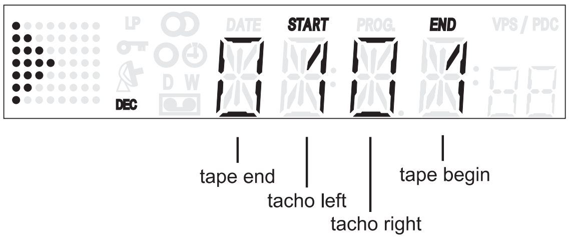
The following errors are visible in the display when the start up routine of the set isn’t working properly.

E000	**IIC-Data** line is low
E001	**IIC-Clock** line is low
E002	**EEPROM** give no acknowledgement



Step 10: Operation without drive - dummy mode
Before activating this mode with the SELECT key, the recorder must be in the EJECT position.

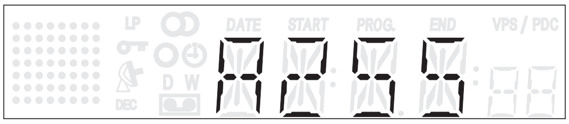
Enter the mode by pressing the SELECT key. The motors are then switched off and the sensors will be ignored by the deck microprocessor. The drive can now be dismantled from the motherboard (see dismantling instructions). **Only install drive if recorder is disconnected from mains.** For signal tracking, the recorder can be set to all drive conditions, i.e. signal electronics, audio and IO processing are switched to the respective operating mode.



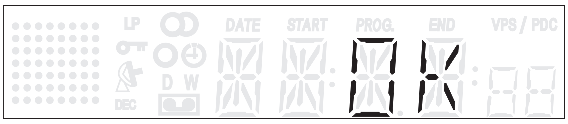
■ ● ◀ ▶	are used to display the deck status
START	init switch (INIT)
END	record protection (RECP)
DEC	Loading pulses (FTA)

Step 40: Option code input

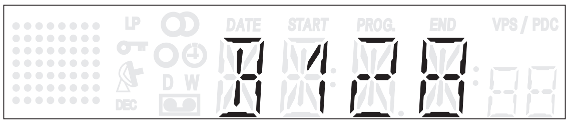
If a new EEPROM is installed in the course of repairs, it must be initialised.
By pressing the SELECT key whilst step 40 is flashing, the decimal option A appears in the display.



By entering a 3-digit decimal code, the correct features are set.
These codes are shown on the type-plate of the recorder.
After pressing the OK key on the remote control, the entered code is saved. The display shows OK for approx. 3 sec. and then the stored value in decimal format.



By pressing the UP and DOWN keys, the available options (A to G) can be selected. The display shows the last stored value in decimal format.



In case of an invalid entry (value >255) the activation of the OK key causes the content of the last stored option to be displayed and OK does not appear in the display.

Depending on the model, some bits are software or default protected and cannot be changed by an entry. In this case, the display shows OK, but the display returns to the default value.

Step 98: Display Test

By pressing the SELECT key whilst step 98 is flashing, all segments of the display are illuminated.

The step is exited by pressing SELECT again.

Engineer's remarks:

5.3 Repair tips

5.3.1 Replacement procedure for leadless components (chip)

The following procedures are recommended for replacing leadless components used in this unit.

1. Preparation for replacement

a. Soldering iron
Use a pencil-type soldering iron that uses less than 30W
b. Solder
Use Eutectic solder (Tin 63%, Lead 37%)
c. Soldering time
Maximum 4 seconds.

Note:
- Leadless components must not be re-used after removal.
- Excessive mechanical stress and rubbing of the component electrode must be avoided.

2. Removing the leadless components

Grasp the leadless component body with tweezers and alternately apply heat to both electrodes. When the solder on both electrodes has melted, remove leadless component with a twisting motion.

Note:
- Do not attempt to lift the component off the board until the component is completely disconnected from the board with a twisting motion.
- Be careful not to break the copper foil on the printed circuit board.

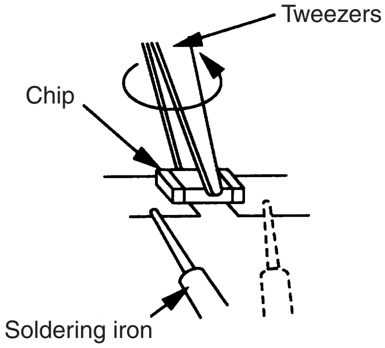
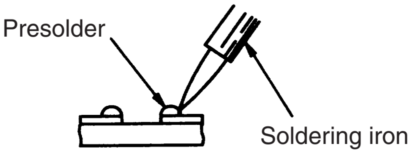


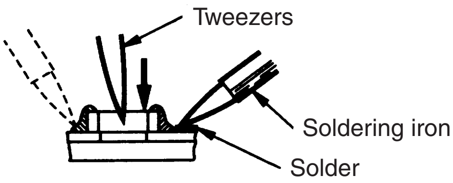
Figure 5-1

3. Installation of leadless components

a. Presolder the contact points on the circuit board



b. Using tweezers press down the part and solder both electrodes as shown below.



Note:
Do not glue the replacement component to the circuit board.

5.3.2 How to remove/install the Flat Pack IC

How to remove the Flat Pack IC

- **Using a hot air Flat Pack IC unsoldering equipment**

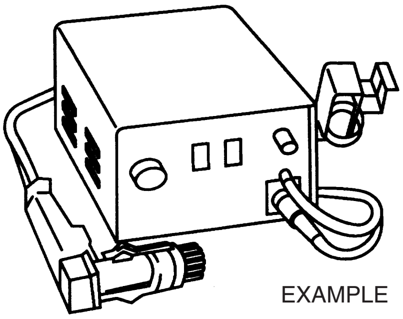


Figure 5-2

a. Prepare the hot air Flat Pack IC unsoldering equipment. Then apply hot air to Flat Pack IC for 5 - 8 seconds.

b. Remove the Flat Pack IC with tweezers while applying the hot air.

CAUTION:
To avoid damage, do not apply the hot air to the chip parts around the Flat Pack IC for long periods.

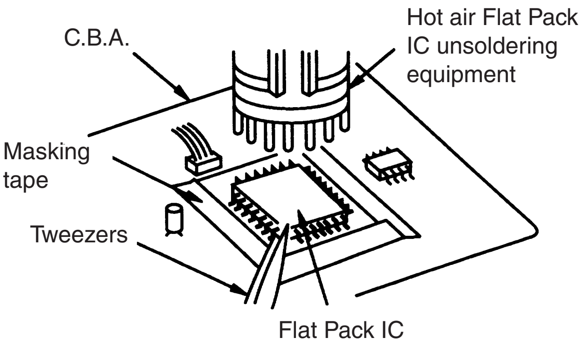


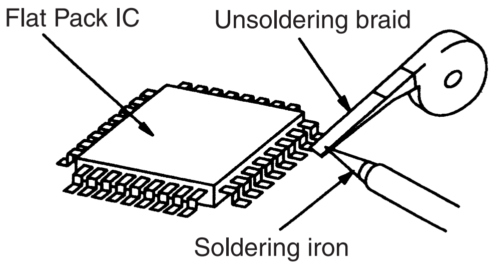
Figure 5-3

Put masking tape around the Flat Pack IC to protect adjacent parts.

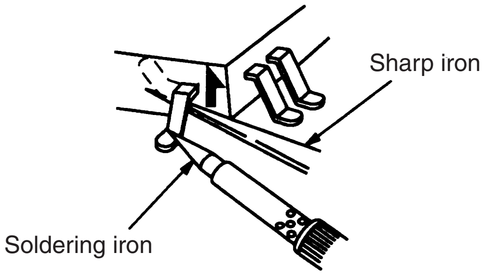
The Flat Pack IC is fixed to the P.C.B. with glue; therefore take care not to break or damage any foil under the IC or on each pin when removing it.

- **Using a soldering iron**

a. Use unsoldering braid to remove the solder from all pins of the Flat Pack IC. Apply solder flux to all pins of the Flat Pack IC, to allow easy removal.


Flat Pack IC
Unsoldering braid
Soldering iron

b. Lift up each lead of the Flat Pack IC individually, using a sharp pin or non-solder wire (iron wire), while heating the pins using a fine tip soldering iron or a hot air blower.


Sharp iron
Soldering iron

- **Using iron wire**

a. Use unsoldering braid to remove the solder from all pins of the Flat Pack IC. Apply solder flux to all pins of the Flat Pack IC, to allow easy removal.

b. Affix the wire to workbench or solid mounting point (see figure 5-3)

c. Pull up the wire as the solder melts in order to lift the IC lead from the P.C.B. contact pad, while heating the pins using a fine-tip soldering iron or hot air blower.

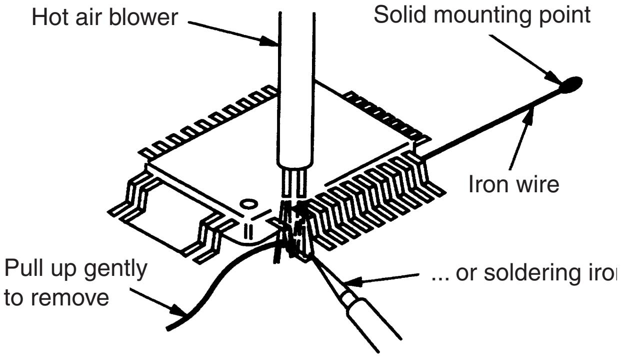

Hot air blower
Solid mounting point
Iron wire
Pull up gently to remove
... or soldering iro

Figure 5-4

Note:
When using a soldering iron care must be taken to ensure that the Flat Pack IC is not held by glue or the P.C.B. may be damaged if force is used.
If the IC is glued, heat the IC with hot air to loosen the glue.

- **Using a special removal device**

a. Apply extra tin-lead solder onto the pins

b. Heat the IC to melt the glue which has been used to affix it

c. Use a solder removing device with a special punch which matches the contours of the IC to remove the IC.

At the other corners there are printed conductors which may be damaged!

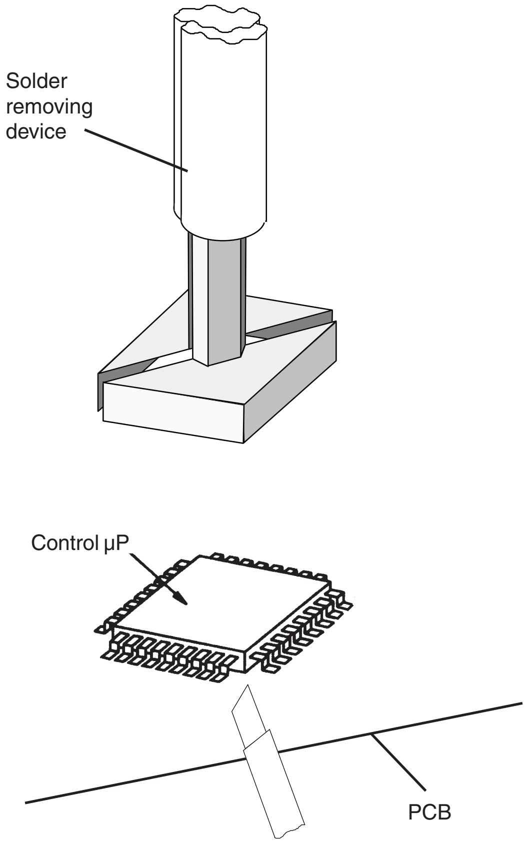

Solder removing device
Control µP
PCB

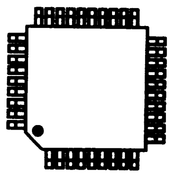
Figure 5-5

How to install the Flat Pack IC

a. Use unsoldering braid to remove the solder from the foil of each pin of the Flat Pack IC on the P.C.B. in order to install the replacement Flat Pack IC more easily.

b. The “dot” mark on the Flat Pack IC indicates pin 1. Make sure this mark matches the 1 on the P.C.B. when positioning for installation. Then pre-solder the four corners of the d. Flat Pack IC. (see figure 5-5).

Example



Pin 1 on Flat Pack IC is market by a "●".

Figure 5-6

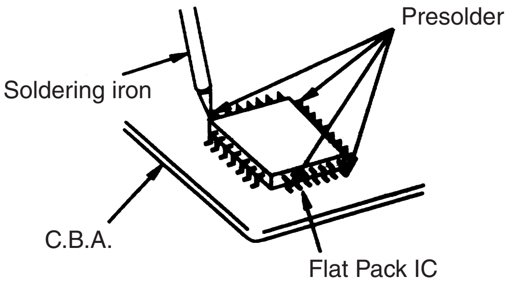

Presolder
Soldering iron
C.B.A.
Flat Pack IC

Figure 5-7

c. Solder all pins of the Flat Pack IC. Make sure that none of the pins have solder bridges between pins on the Flat Pack IC.

5.4 Note

All integrated circuits and many other semiconductor devices are electrostatically sensitive and therefore require the special handling techniques described in the “SAFETY INSTRUCTIONS” section of this manual.

5.5 Voltage measurements

Color bar signal in SP REC and PB modes.

Note:
Voltage indications for the REC. and PB mode on the schematic diagrams are shown below:

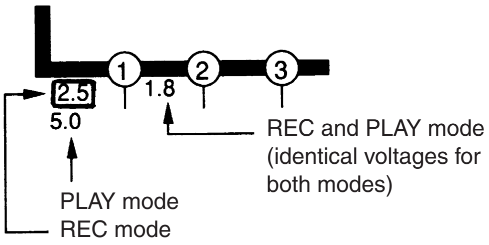

①
②
③
2.5
1.8
5.0
REC and PLAY mode (identical voltages for both modes)
PLAY mode
REC mode

Figure 5-8

5.6 How to read wave forms

① Connecting point
② Aplitude
③ Time base
④ Operating mode of the VCR

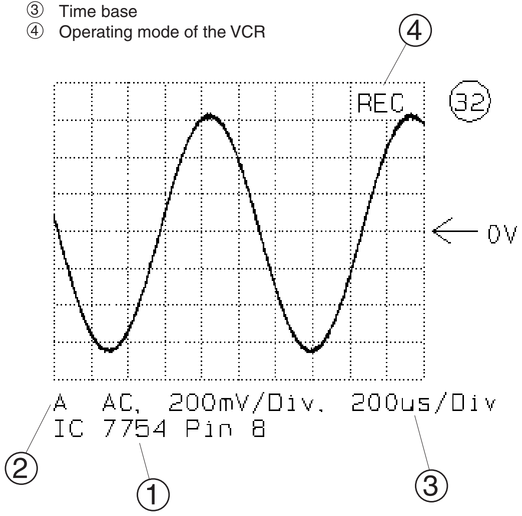


Figure 5-9

5.7 Voltage indication of Zener diodes

The Zener voltage of Zener diodes is indicated as such on schematic diagrams:
Example: BZX79C20............Zener voltage: 20 Volts

5.8 How to identify connectors on schematic diagrams

Each connector is labeled with a connector number and a pin number indicating to what component it is connected; in other words, its counterpart.

Use the Connecting Wiring Diagram to find the connections between associated connectors.

Example:
The connections between C.B.A.s are shown below:

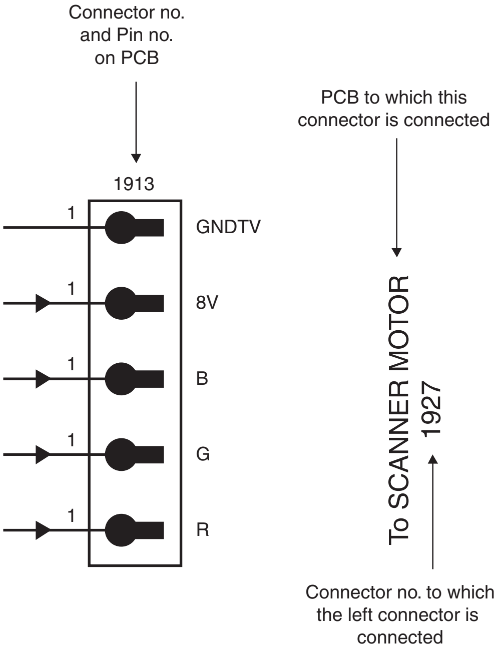
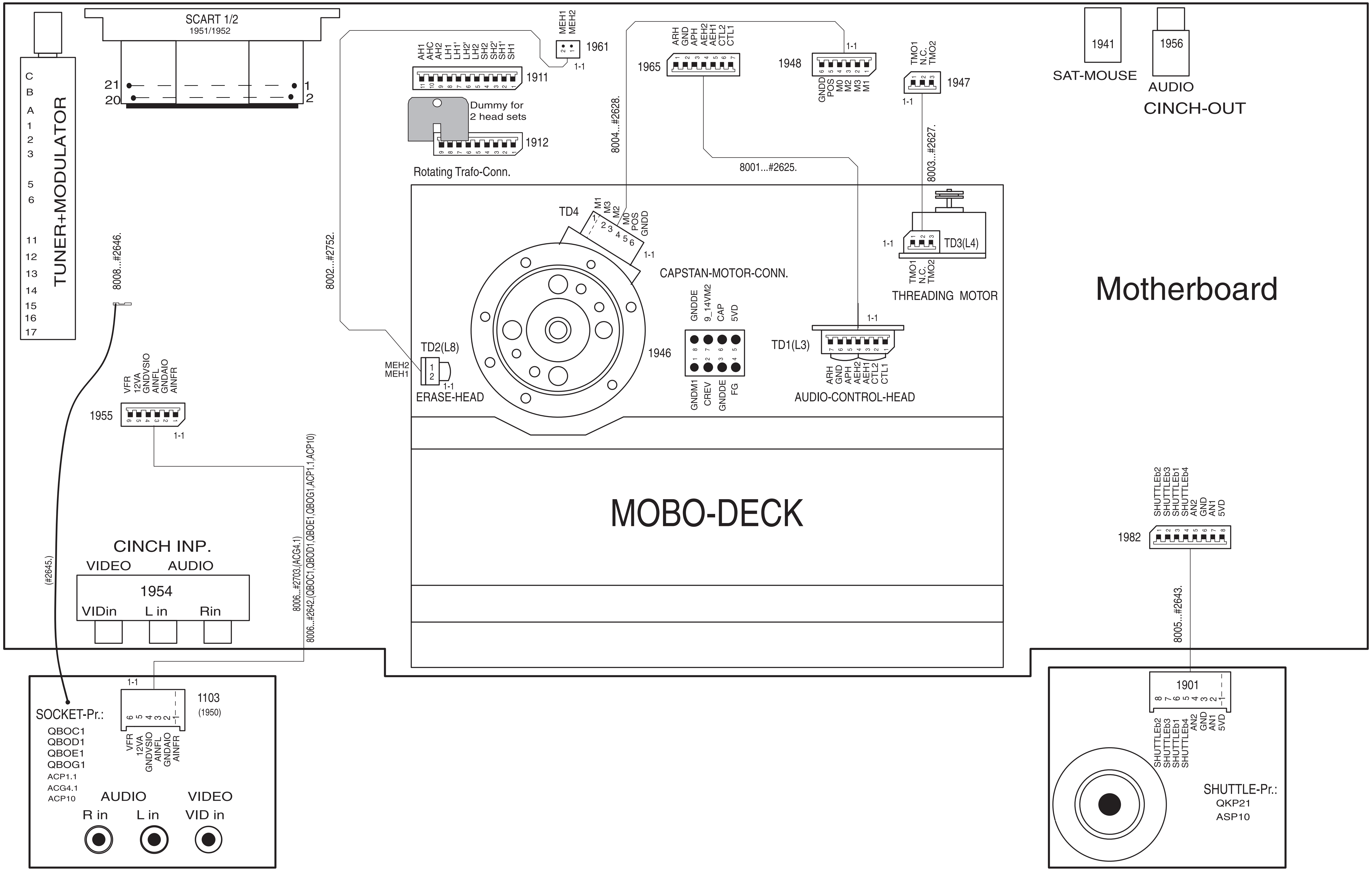

Connector no. and Pin no. on PCB
PCB to which this connector is connected
1913
1
GNDTV
1
8V
1
B
1
G
1
R
To SCANNER MOTOR
1927
Connector no. to which the left connector is connected

Figure 5-10

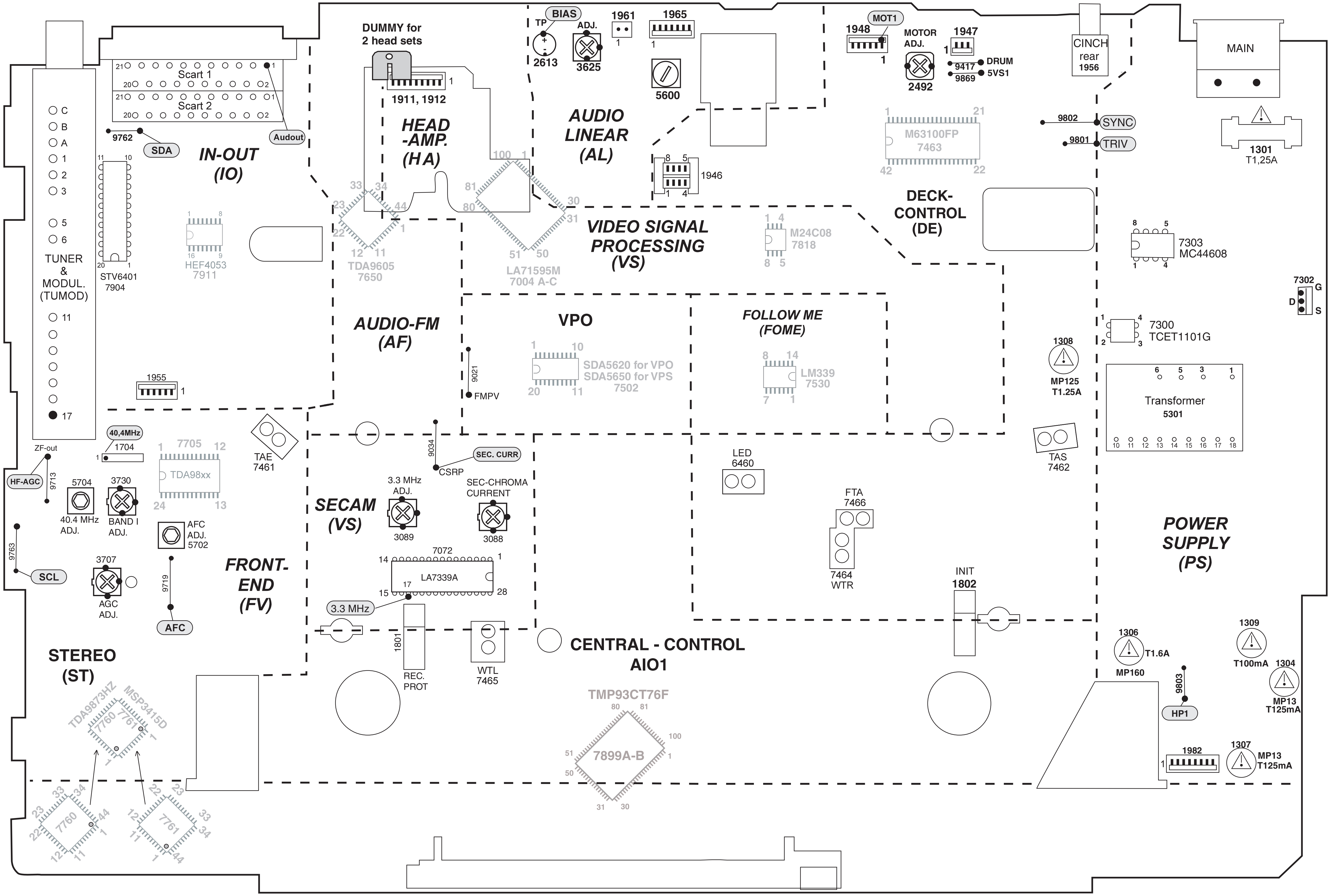
Engineer's remarks:

6. Block diagrams, Waveforms, Wiring diagram

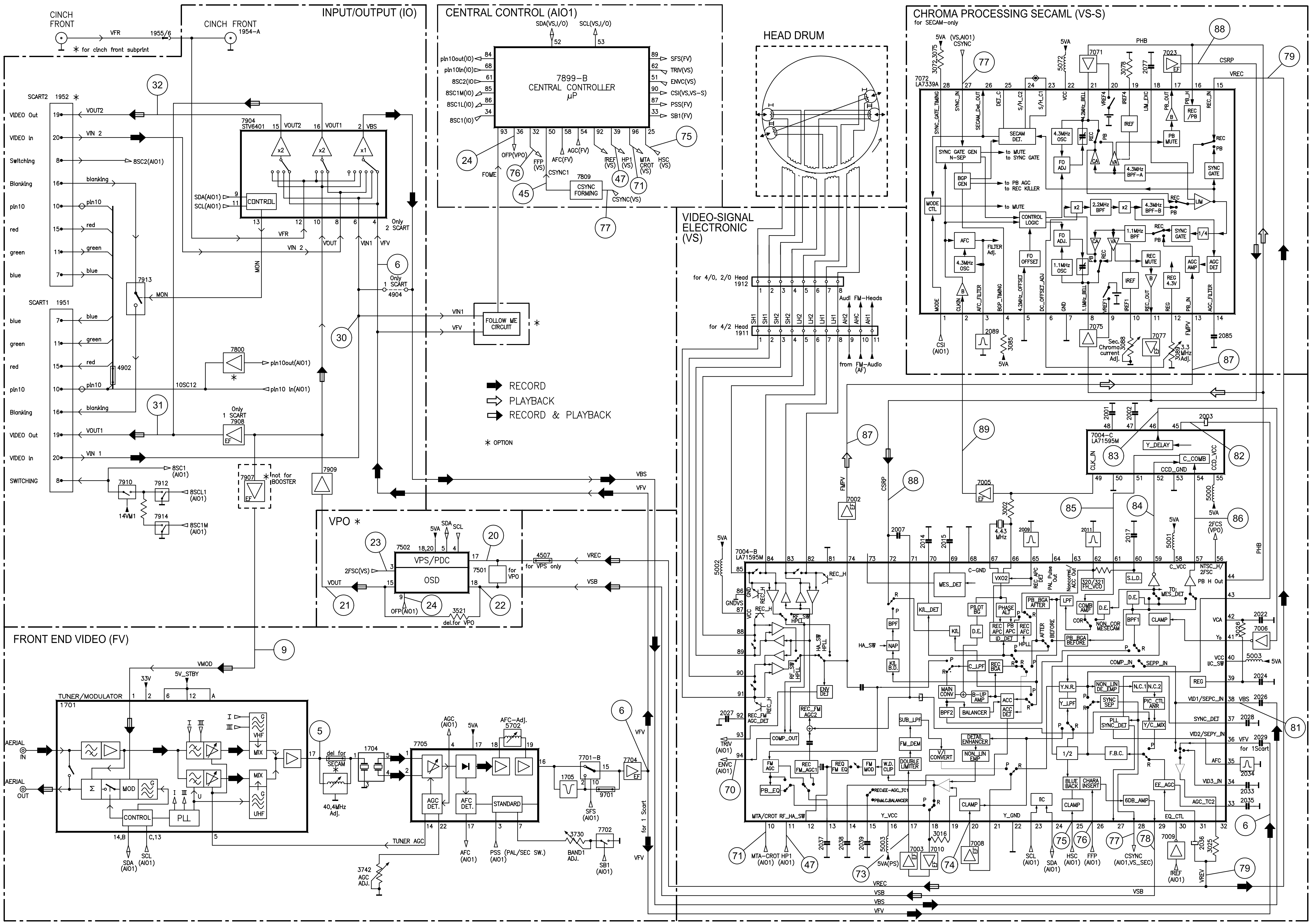
6.1 Wiring diagram


SCART 1/2
1951/1952
21
20
1
2
TUNER+MODULATOR
C
B
A
1
2
3
5
6
11
12
13
14
15
16
17
8008...#2646.
8002...#2752.
AH1
AHC
AH2
LH1
LH1'
LH2'
LH2
SH2
SH2'
SH1'
SH1
1911
Dummy for
2 head sets
1912
Rotating Trafo-Conn.
MEH1
MEH2
1961
1-1
8004...#2628.
ARH
GND
APH
AEH2
AEH1
CTL2
CTL1
1965
8001...#2625.
1948
GNDD
POS
M0
M2
M3
M1
1-1
TMO1
N.C.
TMO2
1947
1-1
8003...#2627.
1941
SAT-MOUSE
1956
AUDIO
CINCH-OUT
Motherboard
TD4
M1
M3
M2
M0
POS
GNDD
1-1
CAPSTAN-MOTOR-CONN.
GNDDE
9_14VM2
CAP
5VD
GNDM1
CREV
GNDDE
FG
1946
TD3(L4)
THREADING MOTOR
TD1(L3)
AUDIO-CONTROL-HEAD
TD2(L8)
MEH2
MEH1
ERASE-HEAD
MOBO-DECK
VFR
12VA
GNDVSIO
AINFL
GNDAIO
AINFR
1955
1-1
8006...#2703.(ACG4.1)
8006...#2642.(QBOC1,QBOD1,QBOE1,QBOG1,ACP1.1,ACP10)
CINCH INP.
VIDEO
AUDIO
1954
VIDin
L in
Rin
(#2645.)
SOCKET-Pr.:
QBOC1
QBOD1
QBOE1
QBOG1
ACP1.1
ACG4.1
ACP10
1103
(1950)
AUDIO
VIDEO
R in
L in
VID in
SHUTTLEb2
SHUTTLEb3
SHUTTLEb1
SHUTTLEb4
AN2
GND
AN1
5VD
1982
8005...#2643.
1901
SHUTTLE-Pr.:
QKP21
ASP10

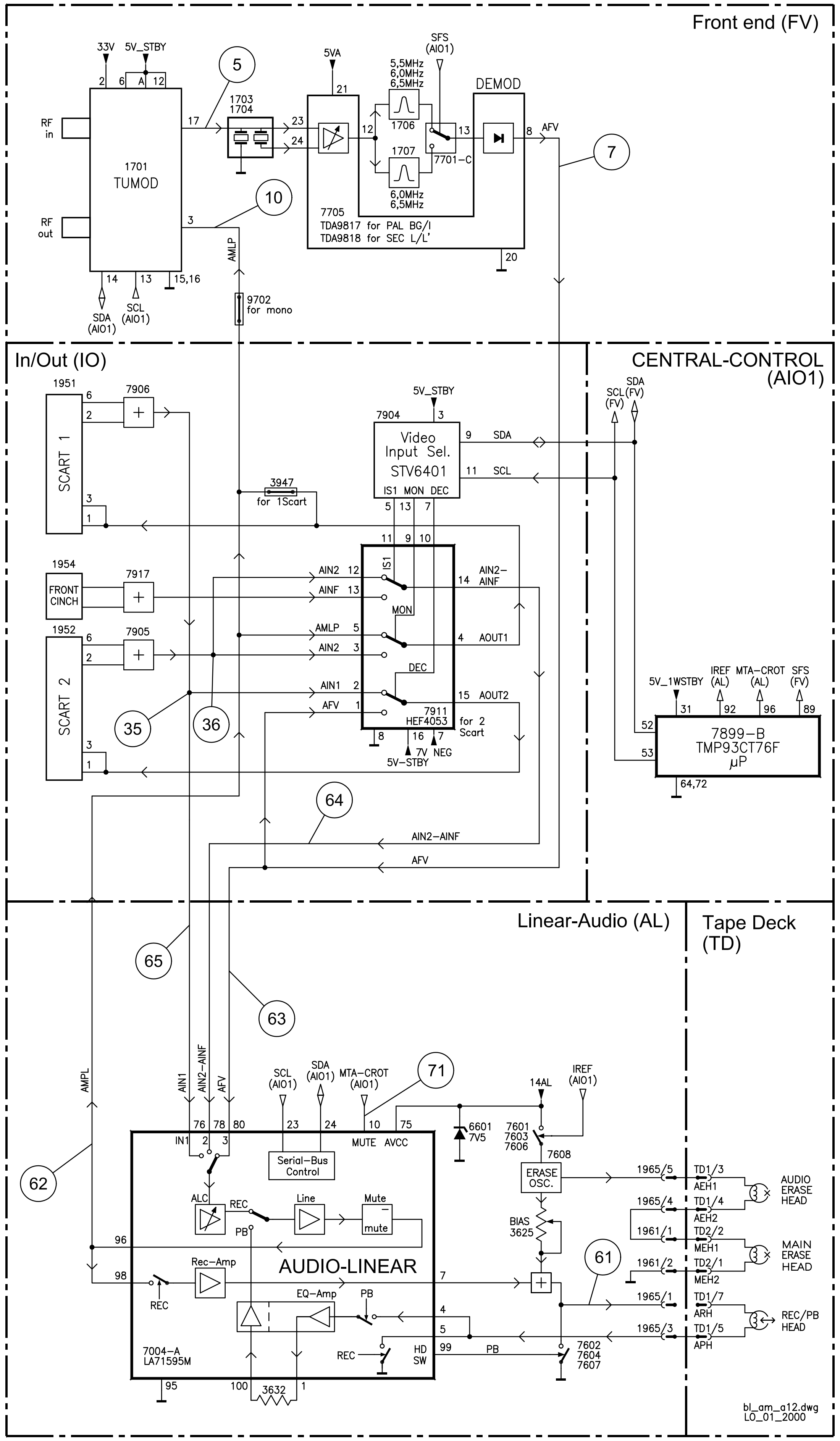
6.2 Test point overview


MAIN
1301
T1,25A
CINCH
rear
1956
SYNC
TRIV
9802
9801
7303
MC44608
7302
G
D
S
7300
TCET1101G
Transformer
5301
1308
MP125
T1.25A
TAS
7462
POWER
SUPPLY
(PS)
1306
T1.6A
MP160
1309
T100mA
1304
MP13
T125mA
1307
MP13
T125mA
9803
HP1
1982
DECK-
CONTROL
(DE)
M63100FP
7463
1948
MOT1
MOTOR
ADJ.
2492
1947
9417
9869
DRUM
5VS1
BIAS
TP
2613
ADJ.
3625
1961
1965
5600
1946
AUDIO
LINEAR
(AL)
DUMMY for
2 head sets
1911, 1912
HEAD
-AMP.
(HA)
VIDEO SIGNAL
PROCESSING
(VS)
LA71595M
7004 A-C
M24C08
7818
TDA9605
7650
IN-OUT
(IO)
Scart 1
Scart 2
Audout
SDA
9762
STV6401
7904
HEF4053
7911
TUNER
&
MODUL.
(TUMOD)
1955
AUDIO-FM
(AF)
VPO
SDA5620 for VPO
SDA5650 for VPS
7502
9021
FMPV
FOLLOW ME
(FOME)
LM339
7530
LED
6460
FTA
7466
7464
WTR
INIT
1802
SECAM
(VS)
9034
CSRP
SEC. CURR
3.3 MHz
ADJ.
3089
SEC-CHROMA
CURRENT
3088
7072
LA7339A
3.3 MHz
1801
REC.
PROT
WTL
7465
CENTRAL - CONTROL
AIO1
TMP93CT76F
7899A-B
TAE
7461
7705
TDA98xx
40,4MHz
1704
ZF-out
HF-AGC
9713
5704
40.4 MHz
ADJ.
3730
BAND I
ADJ.
AFC
ADJ.
5702
9719
AFC
FRONT-
END
(FV)
9763
SCL
3707
AGC
ADJ.
STEREO
(ST)
TDA9873HZ
MSP3415D
7760
7761

6.3 Block diagram Video

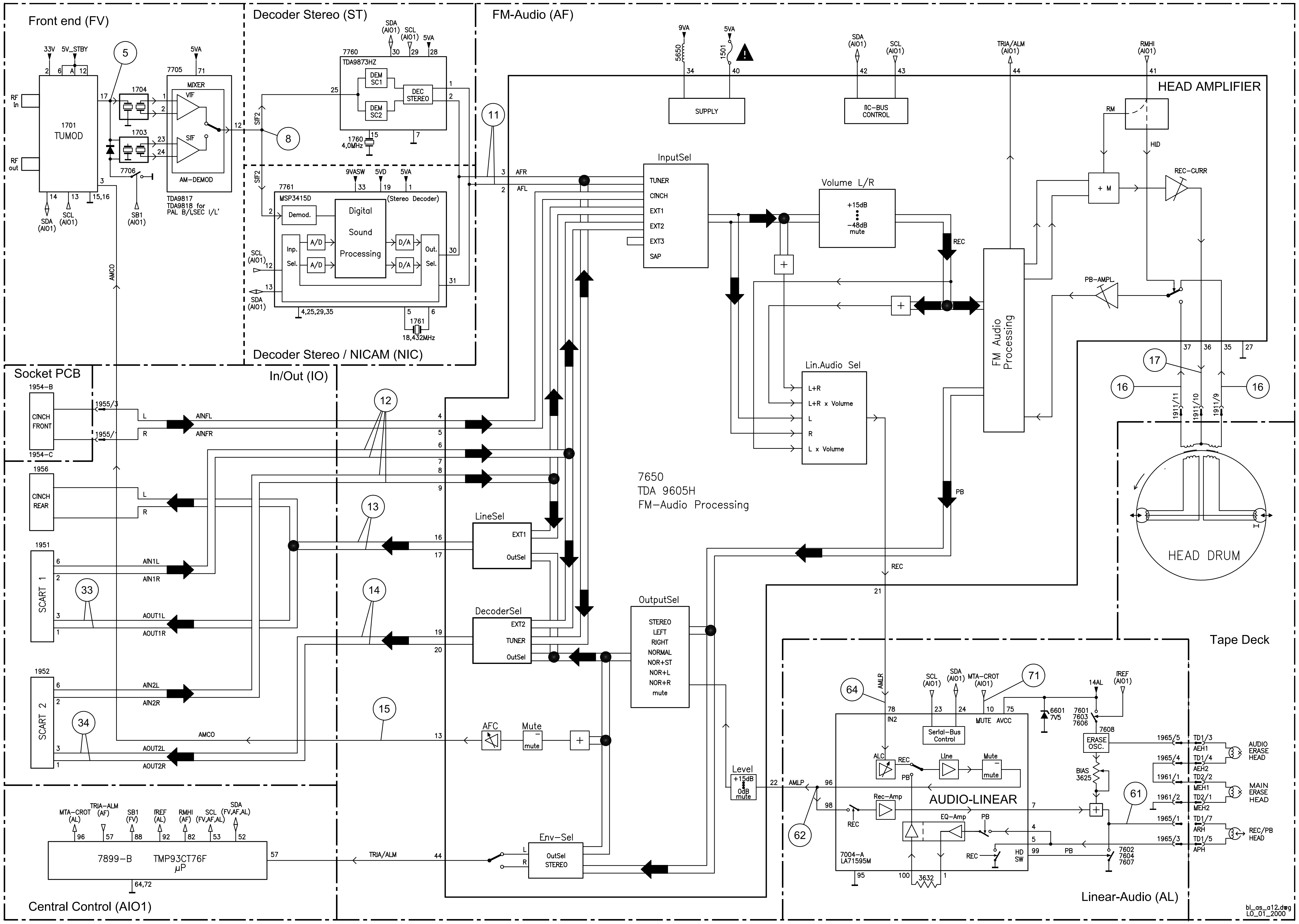

INPUT/OUTPUT (IO)
CENTRAL CONTROL (AIO1)
7899–B
CENTRAL CONTROLLER
µP
HEAD DRUM
CHROMA PROCESSING SECAML (VS-S)
for SECAM–only
7072
LA7339A
VIDEO-SIGNAL
ELECTRONIC
(VS)
7004–B
LA71595M
7004–C
LA71595M
VPO *
VPS/PDC
OSD
FRONT END VIDEO (FV)
TUNER/MODULATOR
1701
CINCH FRONT
SCART2 1952 *
SCART1 1951
7904
STV6401
FOLLOW ME CIRCUIT
RECORD
PLAYBACK
RECORD & PLAYBACK
* OPTION
AERIAL IN
AERIAL OUT
VIDEO Out
VIDEO In
Switching
Blanking
pin10
red
green
blue
SWITCHING
VBS
VFV
VREC
VSB
CSRP
FMPV
PHB

6.4 Block diagram Audio Mono

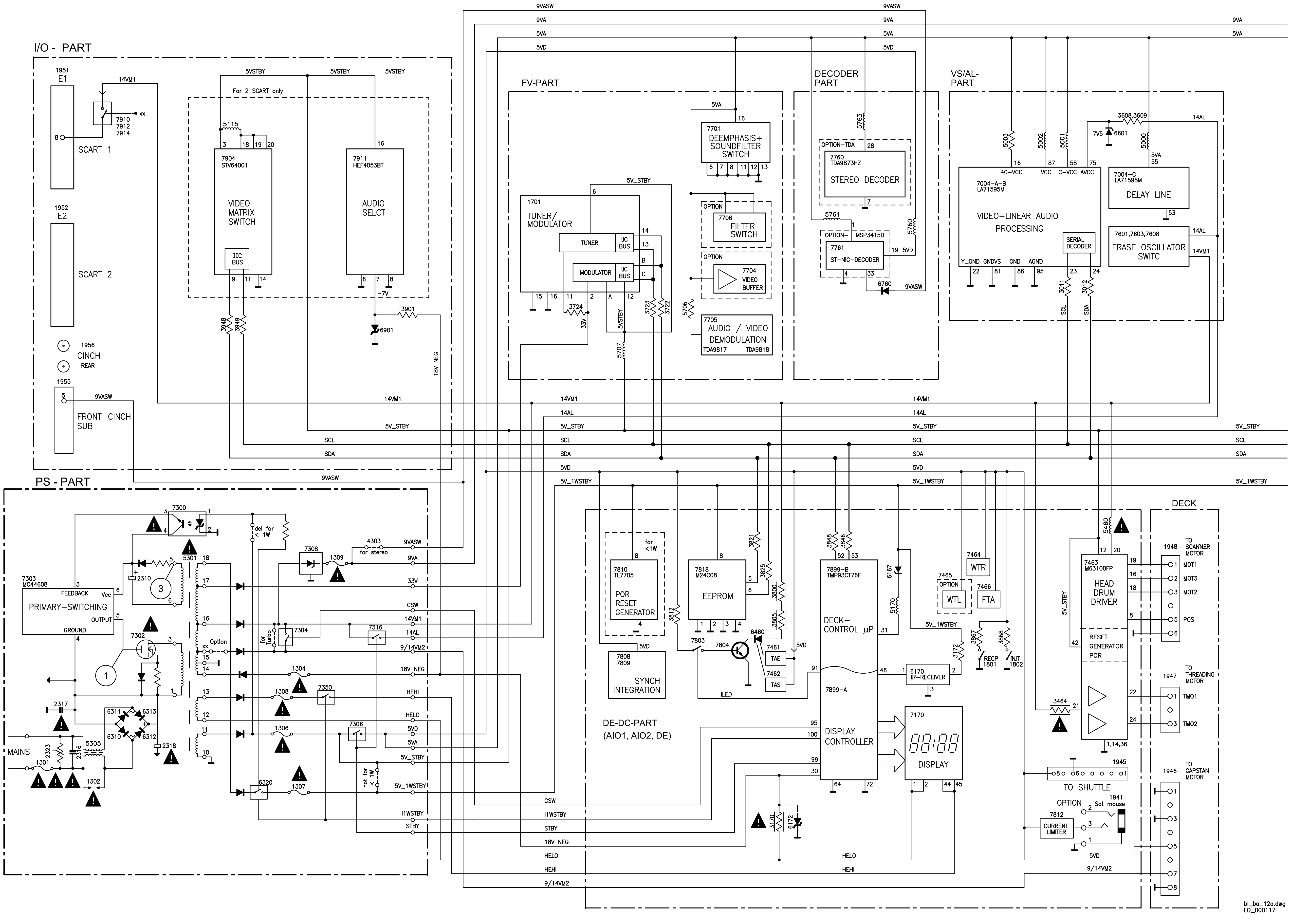

Front end (FV)
33V
5V_STBY
2
6
A
12
RF in
RF out
1701
TUMOD
17
3
14
13
15,16
SDA (AIO1)
SCL (AIO1)
5
1703
1704
10
AMLP
9702
for mono
5VA
21
23
24
12
5,5MHz
6,0MHz
6,5MHz
1706
1707
6,0MHz
6,5MHz
SFS (AIO1)
13
7701-C
DEMOD
8
AFV
7
7705
TDA9817 for PAL BG/I
TDA9818 for SEC L/L'
20
In/Out (IO)
1951
6
2
3
1
SCART 1
7906
1954
FRONT CINCH
7917
1952
SCART 2
7905
3947
for 1Scart
5V_STBY
7904
3
Video Input Sel.
STV6401
9
SDA
11
SCL
IS1 MON DEC
5 13 7
11 9 10
IS1
MON
DEC
AIN2 12
AINF 13
AMLP 5
AIN2 3
AIN1 2
AFV 1
14 AIN2-AINF
4 AOUT1
15 AOUT2
7911
HEF4053
for 2 Scart
8
16
7
7V
NEG
5V-STBY
35
36
64
AIN2-AINF
AFV
CENTRAL-CONTROL (AIO1)
SDA
SCL(FV)
(FV)
5V_1WSTBY
IREF (AL)
MTA-CROT (AL)
SFS (FV)
31
92
96
89
52
53
7899-B
TMP93CT76F
µP
64,72
Linear-Audio (AL)
Tape Deck (TD)
65
63
62
71
AMPL
AIN1
AIN2-AINF
AFV
SCL (AIO1)
SDA (AIO1)
MTA-CROT (AIO1)
76
78
80
23
24
10
75
IN1
2
3
MUTE
AVCC
Serial-Bus Control
ALC
REC
PB
Line
Mute
mute
96
98
Rec-Amp
REC
AUDIO-LINEAR
EQ-Amp
PB
7
4
5
99
PB
REC
HD SW
7004-A
LA71595M
95
100
3632
1
14AL
IREF (AIO1)
6601
7V5
7601
7603
7606
7608
ERASE OSC.
BIAS
3625
61
7602
7604
7607
1965/5
1965/4
1961/1
1961/2
1965/1
1965/3
TD1/3
AEH1
TD1/4
AEH2
TD2/2
MEH1
TD2/1
MEH2
TD1/7
ARH
TD1/5
APH
AUDIO ERASE HEAD
MAIN ERASE HEAD
REC/PB HEAD
bl_am_a12.dwg
LO_01_2000

Engineer's remarks:

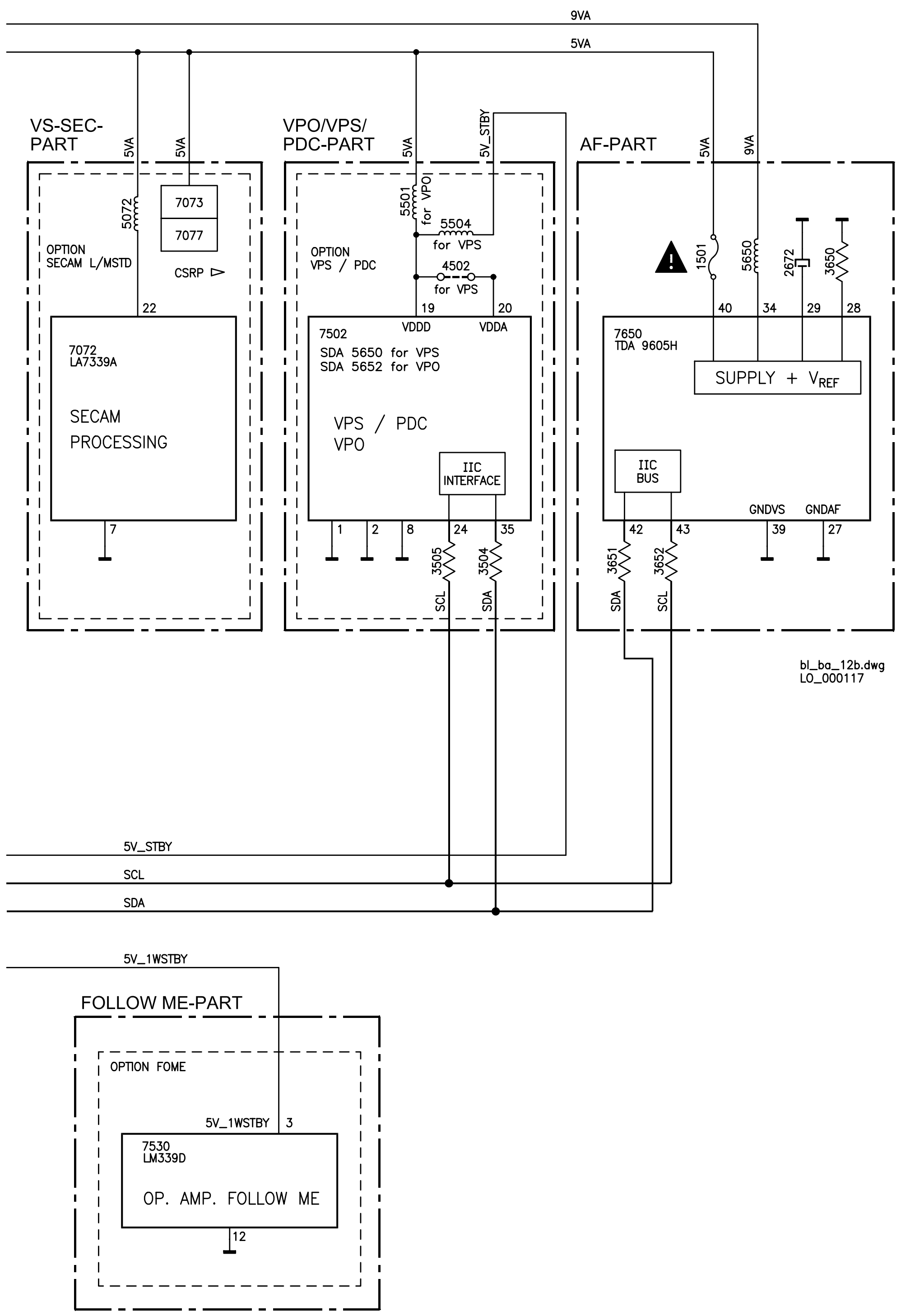
6.5 Block diagram Audio Stereo


Front end (FV)
33V
5V_STBY
1701
TUMOD
RF In
RF out
SDA (AIO1)
SCL (AIO1)
1704
1703
7706
SB1 (AIO1)
7705
MIXER
VIF
SIF
AM-DEMOD
TDA9817
TDA9818 for PAL B/LSEC I/L'
5VA
AMCO
Decoder Stereo (ST)
7760
TDA9873HZ
DEM SC1
DEM SC2
DEC STEREO
1760 4,0MHz
SIF2
Decoder Stereo / NICAM (NIC)
7761
MSP3415D
(Stereo Decoder)
Demod.
Digital Sound Processing
Inp. Sel.
A/D
D/A
Out. Sel.
9VASW
5VD
1761 18,432MHz
4,25,29,35
FM-Audio (AF)
9VA
5650
1501
SUPPLY
IIC-BUS CONTROL
TRIA/ALM (AIO1)
RMHI (AIO1)
HEAD AMPLIFIER
RM
HID
+ M
REC-CURR
PB-AMPL
AFR
AFL
InputSel
TUNER
CINCH
EXT1
EXT2
EXT3
SAP
Volume L/R
+15dB
-48dB
mute
REC
PB
FM Audio Processing
Lin.Audio Sel
L+R
L+R x Volume
L
R
L x Volume
7650
TDA 9605H
FM-Audio Processing
LineSel
OutSel
DecoderSel
OutputSel
STEREO
LEFT
RIGHT
NORMAL
NOR+ST
NOR+L
NOR+R
AFC
Mute
Level
+15dB
0dB
Env-Sel
OutSel STEREO
Socket PCB
1954-B
1954-C
CINCH FRONT
1955/3
1955/1
1956
CINCH REAR
In/Out (IO)
AINFL
AINFR
1951
SCART 1
AIN1L
AIN1R
AOUT1L
AOUT1R
1952
SCART 2
AIN2L
AIN2R
AOUT2L
AOUT2R
Central Control (AIO1)
MTA-CROT (AL)
TRIA-ALM (AF)
SB1 (FV)
IREF (AL)
RMHI (AF)
SCL (FV,AF,AL)
SDA (FV,AF,AL)
7899-B
TMP93CT76F
µP
64,72
TRIA/ALM
Tape Deck
1911/11
1911/10
1911/9
HEAD DRUM
Linear-Audio (AL)
AMLR
AMLP
MUTE
AVCC
IN2
Serial-Bus Control
ALC
Line
Rec-Amp
EQ-Amp
AUDIO-LINEAR
HD SW
7004-A
LA71595M
3632
14AL
6601
7V5
7601
7603
7606
7608
ERASE OSC.
BIAS 3625
7602
7604
7607
1965/5
1965/4
1961/1
1961/2
1965/1
1965/3
TD1/3
AEH1
TD1/4
AEH2
TD2/2
MEH1
TD2/1
MEH2
TD1/7
ARH
TD1/5
APH
AUDIO ERASE HEAD
MAIN ERASE HEAD
REC/PB HEAD
bl_as_a12.dwg
LO_01_2000
5
8
11
12
13
14
15
16
17
33
34
61
62
64
71

6.6 Supply voltages and Bus diagram

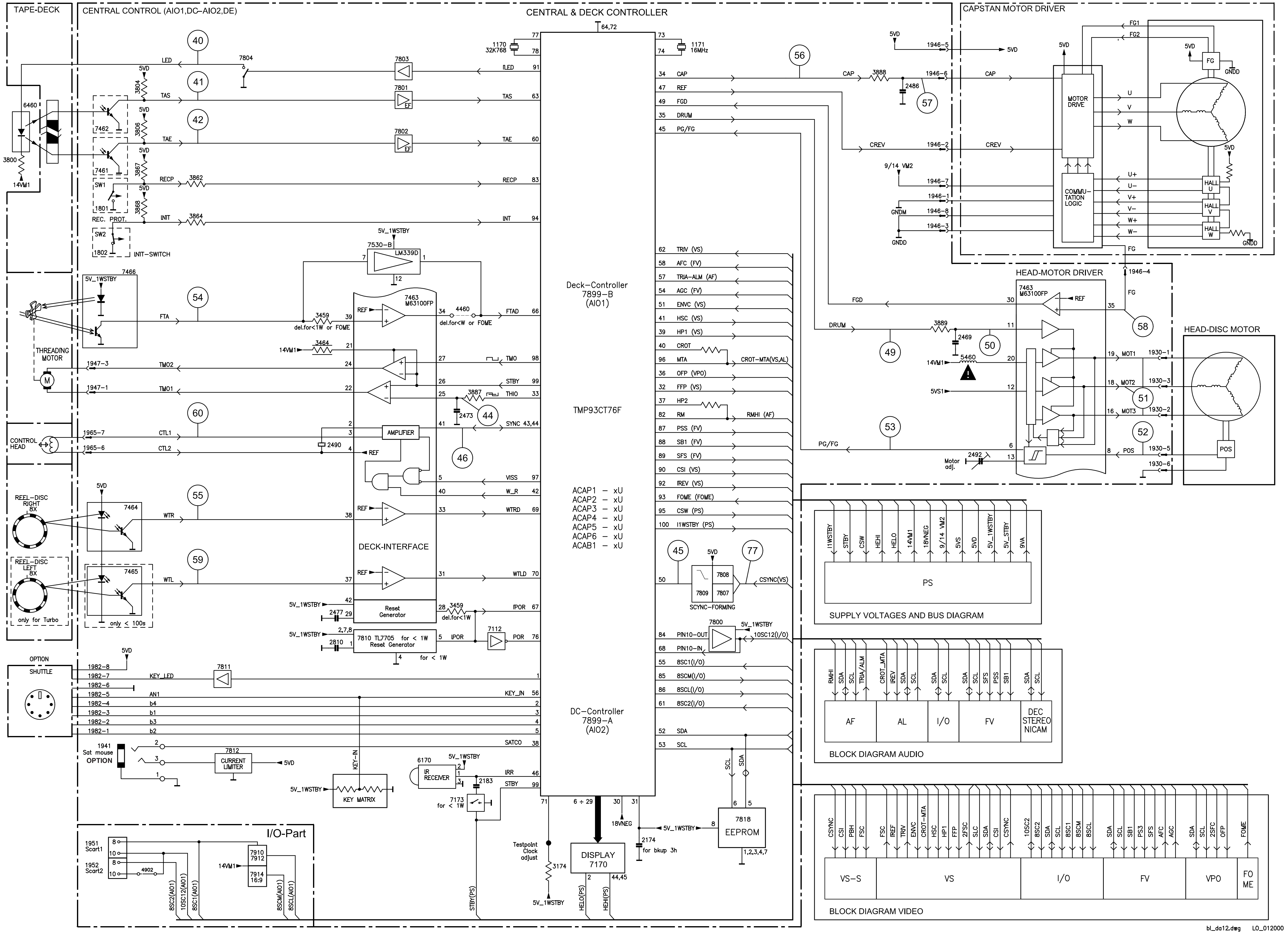

I/O - PART
1951 E1
SCART 1
1952 E2
SCART 2
1956 CINCH REAR
1955 FRONT–CINCH SUB
7910 7912 7914
For 2 SCART only
7904 STV64001 VIDEO MATRIX SWITCH
IIC BUS
7911 HEF4053BT AUDIO SELCT
3948
3949
3901
6901
18V NEG
5VSTBY
14VM1
9VASW
PS - PART
7303 MC44608 PRIMARY–SWITCHING
FEEDBACK
Vcc
OUTPUT
GROUND
7300
7302
5301
2310
2317
2318
2323
2316
5305
6310 6311 6312 6313
1301
1302
MAINS
7308
1309
4303 for stereo
7304 for Turbo
7316
7350
7306 not for < 1W
6320
1304
1306
1307
1308
del for < 1W
Option
9VASW
9VA
33V
CSW
14VM1
14AL
9/14VM2
18V NEG
HEHI
HELO
5VD
5VA
5V_STBY
5V_1WSTBY
I1WSTBY
STBY
FV-PART
1701 TUNER/ MODULATOR
TUNER
MODULATOR
IIC BUS
3724
3722
3723
5707
5706
7701 DEEMPHASIS+ SOUNDFILTER SWITCH
7706 FILTER SWITCH
7704 VIDEO BUFFER
7705 AUDIO / VIDEO DEMODULATION TDA9817 TDA9818
OPTION
DECODER PART
7760 TDA9873HZ STEREO DECODER
OPTION–TDA
7761 ST–NIC–DECODER
OPTION– MSP3415D
5763
5761
5760
6760
VS/AL- PART
7004–A–B LA71595M VIDEO+LINEAR AUDIO PROCESSING
40–VCC VCC C–VCC AVCC
Y_GND GNDVS GND AGND
SERIAL DECODER
7004–C LA71595M DELAY LINE
7601,7603,7608 ERASE OSCILLATOR SWITC
3608,3609
6601
7V5
5003
5002
5001
5000
3011
3012
SCL
SDA
DE-DC-PART (AIO1, AIO2, DE)
7810 TL7705 POR RESET GENERATOR
for <1W
7808 7809 SYNCH INTEGRATION
7818 M24C08 EEPROM
3812
3821
3825
3800
3805
7803
7804
6460
7461 TAE
7462 TAS
ILED
7899–B TMP93CT76F DECK– CONTROL µP
7899–A DISPLAY CONTROLLER
3848
3846
6167
5170
7464 WTR
7465 OPTION WTL
7466 FTA
3172
3867
3868
RECP 1801
INIT 1802
6170 IR–RECEIVER
7170 DISPLAY
3170
6172
7463 M63100FP HEAD DRUM DRIVER
RESET GENERATOR POR
5460
3464
1945 TO SHUTTLE
OPTION
1941 Sat mouse
7812 CURRENT LIMITER
DECK
1948 TO SCANNER MOTOR
MOT1 MOT3 MOT2 POS
1947 TO THREADING MOTOR
TMO1 TMO2
1946 TO CAPSTAN MOTOR
bl_ba_12a.dwg
LO_000117

6.7 Supply voltages and Bus Diagram


9VA
5VA
VS-SEC-PART
5VA
5VA
5072
7073
7077
OPTION SECAM L/MSTD
CSRP
22
7072 LA7339A
SECAM PROCESSING
7
VPO/VPS/PDC-PART
5VA
5V_STBY
5501 for VPO
5504 for VPS
4502 for VPS
OPTION VPS / PDC
19
20
VDDD
VDDA
7502
SDA 5650 for VPS
SDA 5652 for VPO
VPS / PDC VPO
IIC INTERFACE
1
2
8
24
35
3505
3504
SCL
SDA
AF-PART
5VA
9VA
1501
5650
2672
3650
40
34
29
28
7650 TDA 9605H
SUPPLY + VREF
IIC BUS
GNDVS
GNDAF
42
43
39
27
3651
3652
SDA
SCL
bl_ba_12b.dwg
LO_000117
5V_STBY
SCL
SDA
5V_1WSTBY
FOLLOW ME-PART
OPTION FOME
5V_1WSTBY
3
7530 LM339D
OP. AMP. FOLLOW ME
12

Engineer's remarks:

6.8 Block diagram Central Control (AIO2, AIO2)


TAPE-DECK
CENTRAL CONTROL (AIO1,DC–AIO2,DE)
CENTRAL & DECK CONTROLLER
CAPSTAN MOTOR DRIVER
HEAD-MOTOR DRIVER
HEAD-DISC MOTOR
Deck–Controller
7899–B
(AIO1)
TMP93CT76F
ACAP1 – xU
ACAP2 – xU
ACAP3 – xU
ACAP4 – xU
ACAP5 – xU
ACAP6 – xU
ACAB1 – xU
DC–Controller
7899–A
(AIO2)
DECK-INTERFACE
7463
M63100FP
7530–B
LM339D
AMPLIFIER
Reset
Generator
7810 TL7705 for < 1W
Reset Generator
6460
3800
14VM1
7462
7461
SW1
1801
REC. PROT.
SW2
1802
INIT–SWITCH
7466
5V_1WSTBY
THREADING
MOTOR
CONTROL
HEAD
REEL–DISC
RIGHT
8X
REEL–DISC
LEFT
8X
only for Turbo
7464
7465
only < 100s
OPTION
SHUTTLE
1941
Sat mouse
OPTION
7812
CURRENT
LIMITER
KEY MATRIX
KEY–IN
6170
IR
RECEIVER
7173
for < 1W
2183
I/O-Part
1951
Scart1
1952
Scart2
4902
7910
7912
7914
16:9
8SC2(AIO1)
10SC12(AIO1)
8SC1(AIO1)
8SCM(AIO1)
8SCL(AIO1)
STBY(PS)
Testpoint
Clock
adjust
3174
DISPLAY
7170
HELO(PS)
HEHI(PS)
18VNEG
2174
for bkup 3h
7818
EEPROM
1,2,3,4,7
LED
TAS
TAE
RECP
INIT
FTA
TMO2
TMO1
CTL1
CTL2
WTR
WTL
KEY_LED
AN1
b4
b1
b3
b2
1982–8
1982–7
1982–6
1982–5
1982–4
1982–3
1982–2
1982–1
1947–3
1947–1
1965–7
1965–6
40
41
42
54
60
55
59
44
46
45
77
56
57
49
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7804
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7801
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7811
3804
3806
3867
3868
3862
3864
3459
3464
4460
3887
2473
2490
2477
2810
3459
7112
1170
32K768
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16MHz
ILED 91
TAS 63
TAE 60
RECP 83
INT 94
FTAD 66
TMO 98
STBY 99
THIO 33
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VISS 97
W_R 42
WTRD 69
WTLD 70
IPOR 67
POR 76
KEY_IN 56
SATCO 38
IRR 46
STBY 99
del.for<1W or FOME
del.for<W or FOME
del.for<1W
34 CAP
47 REF
49 FGD
35 DRUM
45 PG/FG
62 TRIV (VS)
58 AFC (FV)
57 TRIA–ALM (AF)
54 AGC (FV)
51 ENVC (VS)
41 HSC (VS)
39 HP1 (VS)
40 CROT
96 MTA
36 OFP (VPO)
32 FFP (VS)
37 HP2
82 RM
87 PSS (FV)
88 SB1 (FV)
89 SFS (FV)
90 CSI (VS)
92 IREV (VS)
93 FOME (FOME)
95 CSW (PS)
100 I1WSTBY (PS)
CROT–MTA(VS,AL)
RMHI (AF)
50
7808
7809
7807
SCYNC–FORMING
CSYNC(VS)
7800
84 PIN10–OUT
68 PIN10–IN
10SC12(I/O)
55 8SC1(I/O)
85 8SCM(I/O)
86 8SCL(I/O)
61 8SC2(I/O)
52 SDA
53 SCL
3888
2486
1946–5
1946–6
1946–2
1946–7
1946–1
1946–8
1946–3
1946–4
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GNDM
GNDD
CREV
5VD
MOTOR
DRIVE
COMMU-
TATION
LOGIC
FG
FG1
FG2
U
V
W
U+
U–
V+
V–
W+
W–
HALL U
HALL V
HALL W
3889
2469
5460
5VS1
2492
Motor
adj.
FGD
DRUM
PG/FG
MOT1
MOT2
MOT3
POS
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1930–3
1930–2
1930–5
1930–6
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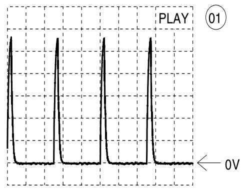
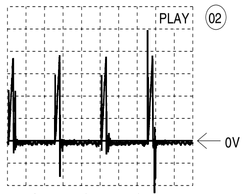
PS
I1WSTBY
STBY
CSW
HEHI
HELO
14VM1
18VNEG
9/14 VM2
5VS
5VD
5V_1WSTBY
5V_STBY
9VA
BLOCK DIAGRAM AUDIO
AF
AL
I/O
FV
DEC
STEREO
NICAM
RMHI
TRIA/ALM
CROT_MTA
IREV
SB1
PSS
SFS
BLOCK DIAGRAM VIDEO
VS–S
VS
I/O
FV
VPO
FO
ME
CSYNC
CSI
PBH
FSC
IREF
TRIV
ENVC
CROT–MTA
HSC
HP1
FFP
2FSC
SLC
SDA
SCL
10SC2
8SC2
8SC1
8SCM
8SCL
SB1
PS3
SFS
AFC
AGC
OFP
FOME
bl_da12.dwg LO_012000

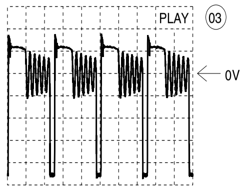
6.9 Waveforms



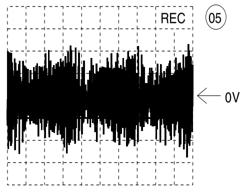
01
A: DC, 2 V/Div, 10us/Div
T 7302 GATE



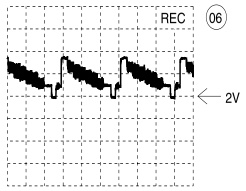
02
A: DC, 100mV/Div, 10us/Div
IC 7303 PIN2



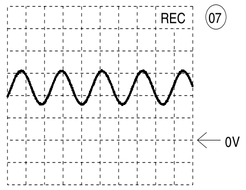
03
A: DC, 10 V/Div, 10us/Div
TRAFO5301 PIN5



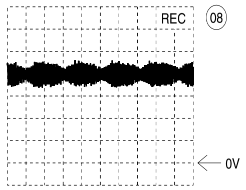
05
A: DC, 500mV/Div, 20us/Div
IC 1701 PIN17



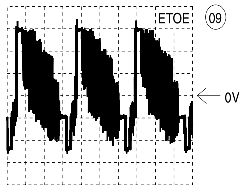
06
A: DC, 500mV/Div, 20us/Div
T7704 EMITTER VFV



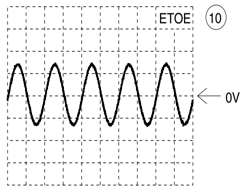
07
A: DC, 1 V/Div, 500us/Div
IC 7705 PIN8 AFV MONO



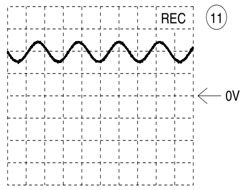
08
A: DC, 500mV/Div, 2us/Div
IC 7705 PIN12 SIF2



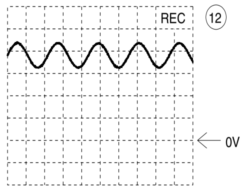
09
A: AC, 200mV/Div, 20us/Div
TUNER 1701 PIN1 VMOD



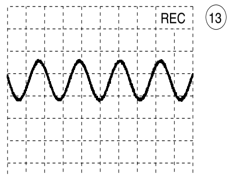
10
A: AC, 500mV/Div, 500us/Div
TUNER 1701 PIN3 AMCO



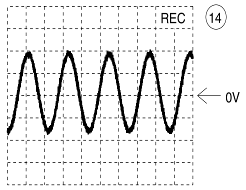
11
A: DC, 2 V/Div, 500us/Div
IC 7761 PIN30,31 AFL,AFR



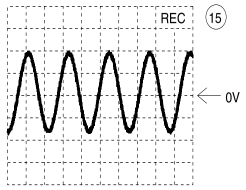
12
A: DC, 1 V/Div, 500us/Div
IC 7650 PIN6 - 9



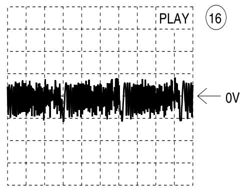
13
A: DC, 1 V/Div, 500us/Div
IC 7650 PIN16,17 AOUT1



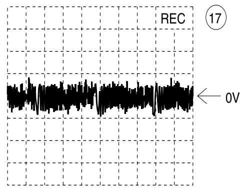
14
A: AC, 1 V/Div, 500us/Div
IC 7650 PIN19,20 AOUT2



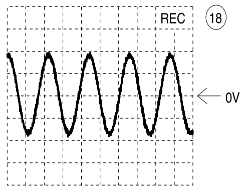
15
A: AC, 500mV/Div, 500us/Div
IC 7650 PIN15 AMCO



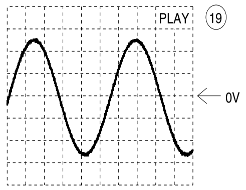
16
A: AC, 50mV/Div, 20us/Div
IC 7650 PIN35,37 AH1/2



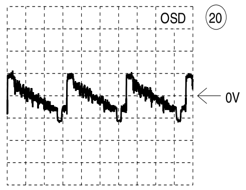
17
A: AC, 50mV/Div, 20us/Div
IC 7650 PIN36 AHC



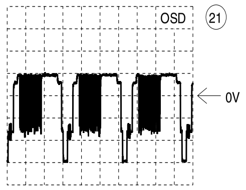
18
A: AC, 200mV/Div, 500us/Div
IC 7650 PIN21 AMLR



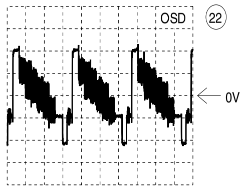
19
A: AC, 200mV/Div, 200us/Div
IC 7650 PIN22 AMLP



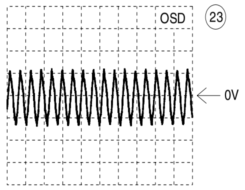
20
A: AC, 500mV/Div, 20us/Div
IC 7502 PIN17



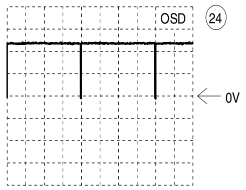
21
A: AC, 500mV/Div, 20us/Div
IC 7502 PIN15 VOUT



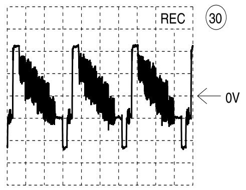
22
A: AC, 500mV/Div, 20us/Div
IC 7502 PIN18 VSB



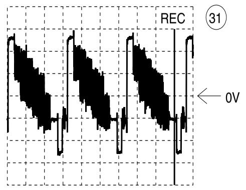
23
A: AC, 100mV/Div, 200ns/Div
IC 7502 PIN3 2FSC



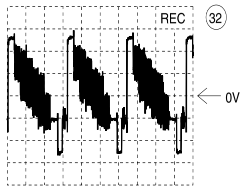
24
A: DC, 2 V/Div, 5ms/Div
IC 7502 PIN9 OFP



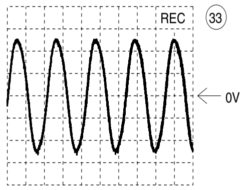
30
A: AC, 200mV/Div, 20us/Div
IC 7904 PIN2 VIN1



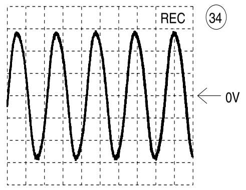
31
A: DC, 200mV/Div, 20us/Div
SCART1 PIN19



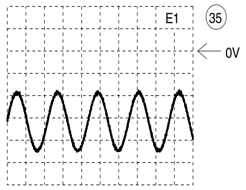
32
A: DC, 200mV/Div, 20us/Div
SCART2 PIN19



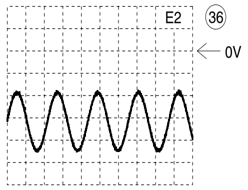
33
A: DC, 200mV/Div, 500us/Div
SCART 1 PIN1/3



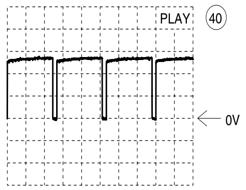
34
A: DC, 200mV/Div, 500us/Div
SCART 2 PIN1/3



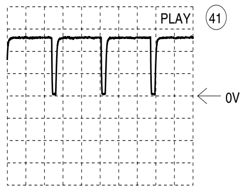
35
A: DC, 200mV/Div, 500us/Div
T7906 EMITTER AIN1



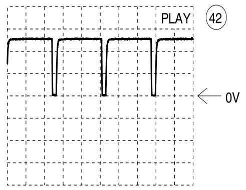
36
A: DC, 200mV/Div, 500us/Div
T7905 EMITTER AIN2



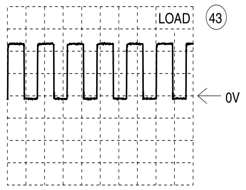
40
A: DC, 5 V/Div, 5ms/Div
T 7804 COLLECTOR LED



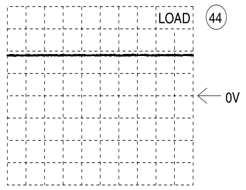
41
A: DC, 2 V/Div, 5ms/Div
T 7462 COLLECTOR TAS



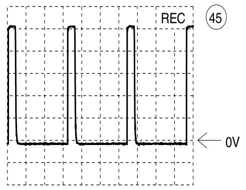
42
A: DC, 2 V/Div, 5ms/Div
T 7461 COLLECTOR TAE



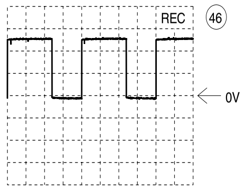
43
A: DC, 2 V/Div, 20us/Div
IC 7899-B PIN33 THIO



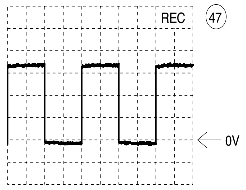
44
A: DC, 2 V/Div, 20us/Div
IC 7463 PIN25 THIO



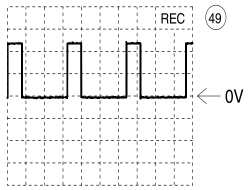
45
A: DC, 1 V/Div, 20us/Div
T 7809 COLLECTOR CSYNC



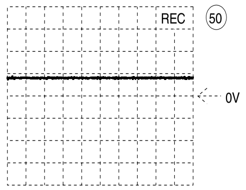
46
A: DC, 2 V/Div, 10ms/Div
TP 9802 SYNC



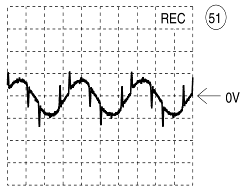
47
A: DC, 500mV/Div, 10ms/Div
TP9803 HP1



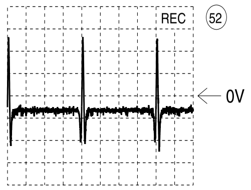
49
A: DC, 2 V/Div, 10us/Div
IC 7899-B PIN35 DRUM_DIG



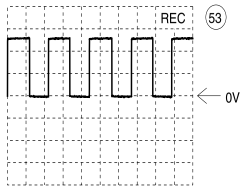
50
A: DC, 1 V/Div, 200us/Div
IC 7463 PIN11 DRUM



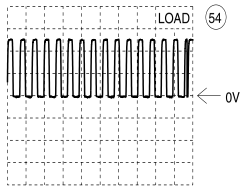
51
A: AC, 5 V/Div, 2ms/Div
CON 1948 PIN 1-3



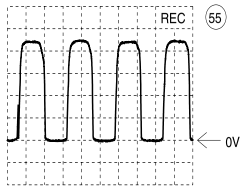
52
A: DC, 200mV/Div, 10ms/Div
CON 1948 PIN 5 PG



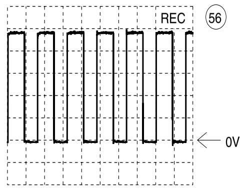
53
A: DC, 2 V/Div, 1ms/Div
IC 7463 PIN6 PG/FG



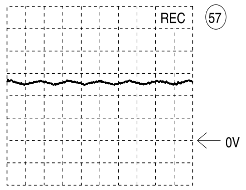
54
A: DC, 2 V/Div, 20ms/Div
T 7466 COLLECTOR FTA



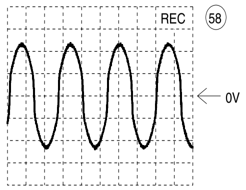
55
A: DC, 1 V/Div, 200ms/Div
T 7464 COLLECTOR WTR



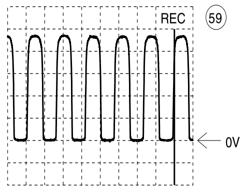
56
A: DC, 1 V/Div, 20us/Div
IC7899-B PIN34 CAP_DIG



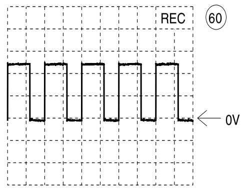
57
A: DC, 1 V/Div, 20us/Div
CON 1946 PIN6 CAP



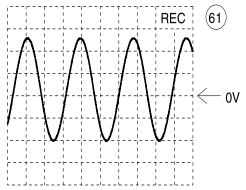
58
A: AC, 500mV/Div, 500us/Div
CON 1946 PIN 4 FG



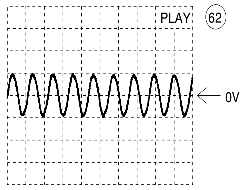
59
A: DC, 1 V/Div, 500ms/Div
T 7465 COLLECTOR WTL



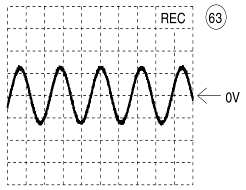
60
A: DC, 2 V/Div, 20ms/Div
IC 7463 PIN3 CTL1



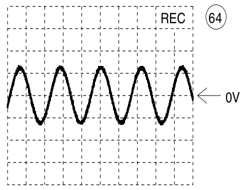
61
A: DC, 10 V/Div, 5us/Div
R 3625 BIAS



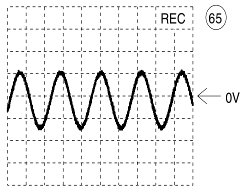
62
A: AC, 500mV/Div, 1ms/Div
IC 7004-A PIN96 AMLP



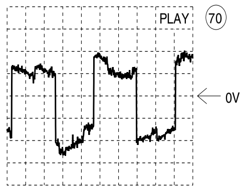
63
A: AC, 100mV/Div, 500us/Div
IC 7004-A PIN80 AFV



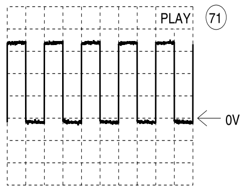
64
A: 6C, 100mV/Div, 500us/Div
IC 7004-A PIN78 AIN2



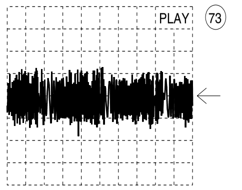
65
A: AC, 100mV/Div, 500us/Div
IC 7704-A PIN76 AIN1



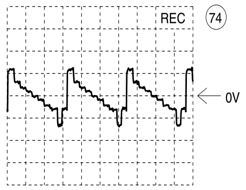
70
A: AC, 50mV/Div, 500us/Div
IC 7004-B PIN94 ENVC



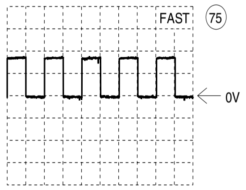
71
A: DC, 500mV/Div, 20ms/Div
IC 7004-B PIN10 CROT/MTA



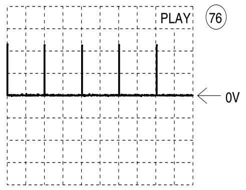
73
A: AC, 100mV/Div, 20us/Div
T 7003 EMITTER



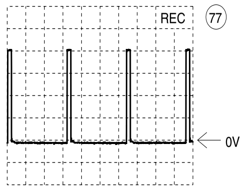
74
A: AC, 200mV/Div, 20us/Div
T 7008 EMITTER



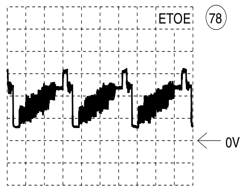
75
A: DC, 1 V/Div, 20ms/Div
IC 7004-B PIN25 HSC



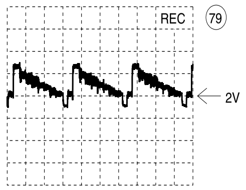
76
A: DC, 2 V/Div, 10ms/Div
IC 7004-B PIN26 FFP



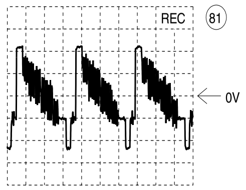
77
A: DC, 1 V/Div, 20us/Div
IC 7072 PIN27 CSYNC



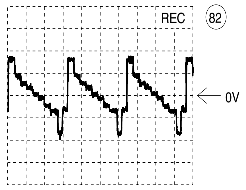
78
A: DC, 1 V/Div, 20us/Div
IC 7004-B PIN29 VSB PAL



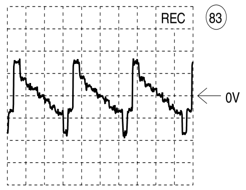
79
A: DC, 500mV/Div, 20us/Div
C 2075,2036 VREC



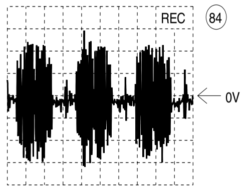
81
A: AC, 200mV/Div, 20us/Div
IC 7704-B PIN38 VBS



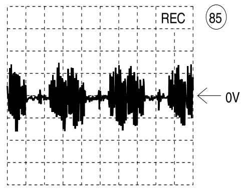
82
A: AC, 100mV/Div, 20us/Div
IC 7004-C PIN45



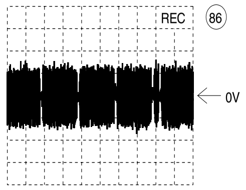
83
A: AC, 100mV/Div, 20us/Div
IC 7004-C PIN46



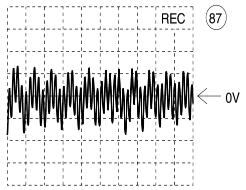
84
A: AC, 50mV/Div, 20us/Div
IC 7004-C PIN52



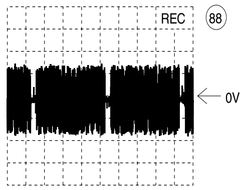
85
A: AC, 100mV/Div, 20us/Div
IC 7004-C PIN51



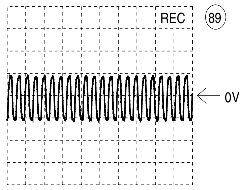
86
A: AC, 100mV/Div, 10ms/Div
IC 7004-C PIN54



87
A: AC, 200mV/Div, 1us/Div
T 7002 EMITTER FMPV



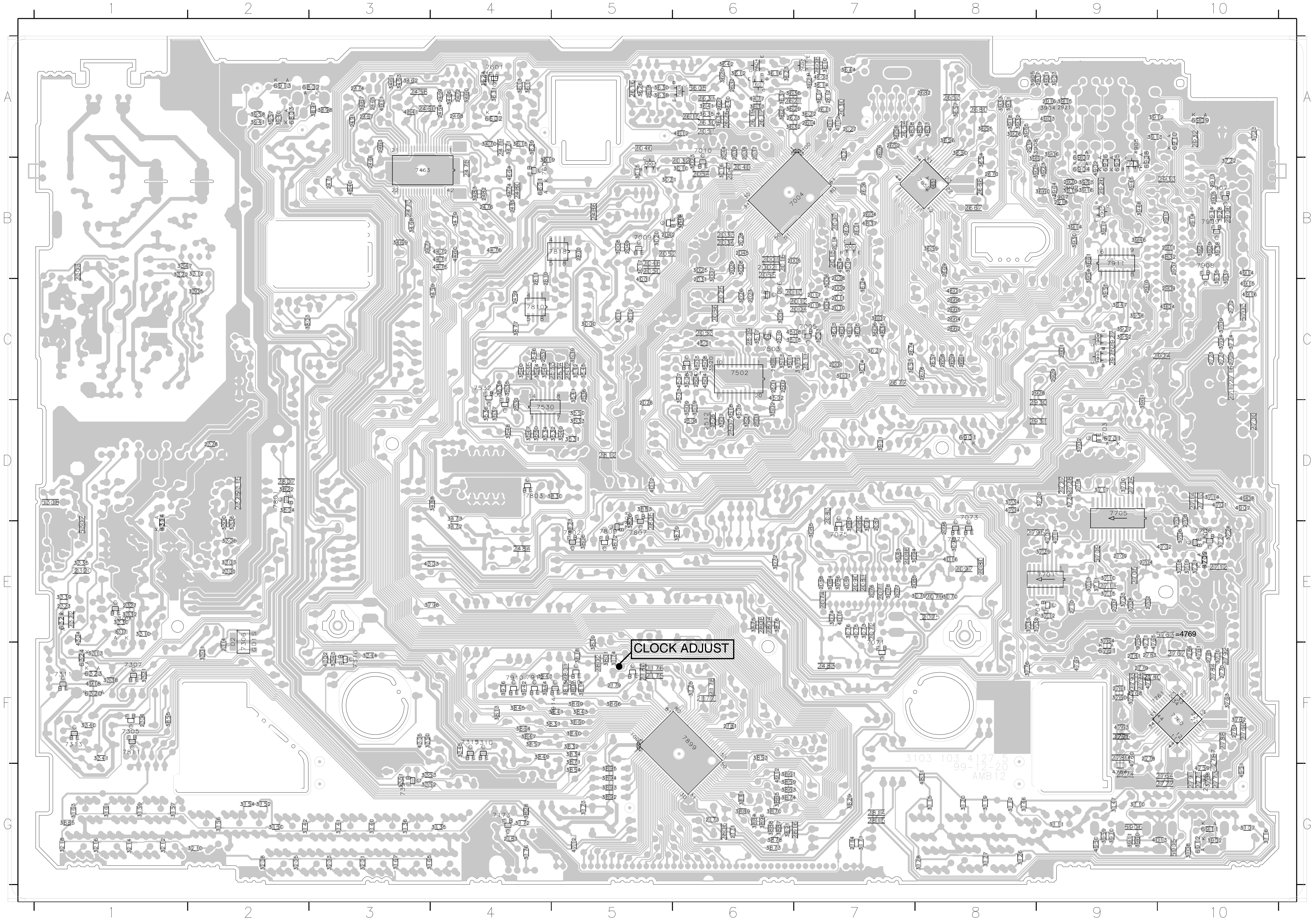
88
A: AC, 100mV/Div, 5ms/Div
T 7073 EMITTER (PAL)CSRP



89
A: AC, 200mV/Div, 500ns/Div
T7005 EMITTER FSC

7. Circuit diagrams and PWB layouts

7.1 Mother board - solder side


CLOCK ADJUST
4769
3103 103 4127.5
99-12-20
AMB12
1
2
3
4
5
6
7
8
9
10
A
B
C
D
E
F
G

2000	C7
2001	B6
2002	B6
2004	C7
2005	B7
2007	B7
2008	B7
2009	C7
2010	C7
2011	C7
2012	C7
2013	C6
2014	B7
2015	B7
2016	B6
2017	C7
2018	C7
2021	A7
2023	C6
2025	C6
2026	D5
2027	A7
2028	B6
2029	B6
2030	A7
2031	C6
2032	B6
2033	B6
2034	B6
2037	A6
2038	A6
2039	A6
2040	B6
2042	B5
2044	A6
2045	B6
2046	A5
2047	B6
2048	B5
2049	B5
2050	B5
2051	A6
2052	B5
2053	C6
2054	B6
2055	B6
2056	C6
2071	E7
2072	E7
2074	E7
2075	E8
2076	E7
2077	E7
2079	E8
2080	E8
2081	E7
2082	E7
2083	D7
2085	E7
2086	E7
2087	E7
2088	E7
2089	E7
2090	E7
2096	E8
2097	E8
2171	G6
2173	G6
2175	F5
2176	F5
2177	F6
2178	F6
2179	F5
2180	F5
2181	F6
2183	G4
2184	G7
2300	E2
2303	B1
2306	F1
2314	F2
2315	D2
2320	E1
2322	E1
2323	E1
2325	D2
2327	E1
2328	D2
2458	A3
2459	C4
2460	A3
2463	A3
2464	A4
2465	A3
2466	B3
2467	A3
2468	A4
2469	A4
2471	B3
2472	A4
2473	B3
2474	A3
2475	B4
2476	B4
2477	B3
2479	A4
2480	B4
2482	B4
2483	F7
2484	E4
2485	B4
2486	B5
2491	A3
2501	C6
2502	C6
2503	D6
2504	C6
2505	D6
2506	D6
2507	D6
2508	C6
2509	C6
2510	C6
2511	C7
2512	D6
2530	D4
2532	C5
2533	C5
2534	C5
2535	C4
2536	C5
2537	C4
2601	B7
2604	B7
2605	B7
2606	B7
2608	A7
2611	A7
2612	A7
2614	A7
2615	A6
2616	A5
2617	A6
2618	A5
2619	A6
2621	A6
2623	A6
2626	A6
2627	A6
2630	A6
2631	A6
2632	A6
2652	A7
2653	A8
2654	A7
2657	C8
2658	C8
2659	C8
2661	C8
2662	C8
2664	C8
2665	C8
2666	C8
2667	B8
2668	B8
2669	B8
2670	B8
2674	C7
2676	A7
2677	C7
2678	C8
2680	A8
2682	A8
2700	D10
2702	E9
2704	E9
2705	E9
2707	E9
2708	D10
2709	E9
2710	E9
2711	E9
2712	E10
2713	D10
2714	D10
2716	C10
2717	C10
2718	D9
2721	C10
2722	C10
2723	C10
2724	D9
2725	C10
2727	D9
2728	D9
2760	F10
2761	F9
2763	F10
2764	G10
2765	F9
2767	F10
2770	F10
2771	G10
2772	G10
2773	G10
2774	G9
2775	F9
2777	G10
2778	F9
2779	F9
2780	F9
2781	F9
2783	F9
2784	F10
2785	F10
2786	F10
2787	F10
2788	F10
2789	F9
2791	G10
2792	F10
2793	F9
2794	F9
2795	E8
2800	B5
2801	F5
2802	F5
2804	E6
2805	E5
2806	G6
2807	D2
2808	E6
2810	C4
2811	C4
2812	D5
2814	G7
2815	G7
2816	G7
2901	C9
2905	B10
2906	B10
2907	B10
2909	C10
2910	C9
2911	B10
2912	B10
2913	B10
2914	B10
2916	A9
2917	A9
2918	B9
2919	A8
2920	B9
2921	A9
2924	C10
2925	C9
2926	B9
2927	C9
2928	C9
2929	C9
2930	D9
2931	D9
2932	A10
2933	B10
3000	C5
3001	C7
3003	C7
3004	C7
3005	C6
3006	C7
3007	B6
3008	B5
3009	B7
3010	B6
3011	C5
3012	C5
3014	C7
3015	B5
3016	B6
3017	B5
3018	B6
3020	B5
3021	B5
3023	B6
3025	B6
3026	C6
3027	C7
3028	B6
3070	E8
3072	E6
3073	E7
3074	E7
3075	E7
3076	E7
3078	E7
3079	E8
3083	E7
3084	E7
3085	E7
3086	E7
3087	E7
3091	E7
3094	E7
3095	E8
3107	G10
3108	G10
3110	G9
3111	G9
3112	G8
3115	G8
3116	G10
3119	G8
3120	G8
3126	G8
3127	G8
3128	G8
3135	G4
3136	G3
3140	G3
3141	G3
3142	G2
3146	G8
3147	G9
3150	G2
3152	G2
3154	G2
3156	G2
3157	G1
3159	G1
3161	G1
3163	G1
3165	G3
3167	G3
3171	G7
3172	G4
3173	G5
3174	F5
3175	F6
3176	G4
3201	G3
3203	G3
3205	G2
3208	G2
3210	G2
3212	G1
3214	G1
3216	G1
3218	G1
3300	E2
3301	F2
3303	E2
3305	C2
3306	E2
3310	E1
3312	B2
3313	F1
3321	F1
3322	B1
3330	E1
3332	E1
3335	E1
3336	E2
3338	F1
3339	E1
3340	F1
3341	F1
3343	F3
3344	F3
3345	F4
3347	B1
3350	F3
3351	G3
3352	G3
3353	G3
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3461	A3
3462	A3
3463	A3
3466	A4
3467	A3
3468	B3
3469	B3
3470	A4
3471	A4
3472	E4
3473	D4
3474	B4
3479	B4
3483	B4
3488	D4
3502	D6
3503	C6
3506	C6
3507	D6
3508	C6
3509	D6
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3516	C7
3517	C6
3518	D6
3519	D6
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3614	A7
3615	A4
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3621	A7
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3627	A6
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3631	A4
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3635	A6
3636	A6
3637	A6
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3639	A4
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3653	C7
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3655	A8
3656	A8
3657	A8
3658	A7
3659	B8
3660	B9
3661	B9
3700	D9
3701	D10
3702	D9
3703	E9
3704	C10
3706	E10
3708	E9
3709	C10
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3718	E10
3719	E10
3720	D9
3721	E10
3722	B10
3723	A10
3724	C10
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3729	E9
3732	E8
3733	E8
3734	D8
3760	F9
3762	F10
3763	F10
3764	E9
3768	G10
3770	F10
3771	E9
3775	F9
3776	F8
3796	E4
3801	F5
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3804	D2
3806	E5
3807	F5
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3814	F5
3815	F5
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3822	D2
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3826	E5
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3845	F4
3847	F4
3849	F4
3853	F6
3854	G5
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3857	F4
3859	G6
3860	F5
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3865	G6
3866	F5
3869	F5
3870	G6
3871	F5
3872	E5
3873	G6
3874	G6
3875	E6
3876	E6
3877	C4
3878	G6
3879	E6
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3883	D5
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3885	G1
3887	G6
3888	G6
3889	G6
3891	G6
3892	G5
3893	G5
3894	G5
3895	G5
3896	G6
3897	A3
3898	A3
3901	D7
3902	G10
3903	A9
3904	A9
3905	A8
3906	A9
3907	B9
3908	A8
3909	B9
3910	G9
3911	G9
3912	A9
3913	A9
3914	B9
3915	A9
3916	B9
3917	B9
3918	A8
3919	B9
3921	B10
3923	B9
3925	B8
3926	A8
3927	C9
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3929	B10
3930	B9
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3932	A8
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3934	B10
3935	B10
3936	F4
3937	B10
3938	B10
3940	A2
3941	A2
3942	F4
3943	F4
3944	F4
3945	B9
3946	B9
3947	C9
3948	B9
3952	C9
3954	B9
3955	C9
3956	C9
3957	A2
3958	A2
3959	G9
3960	G9
3961	D9
3963	B9
3964	B9
3965	A8
3967	B8
4001	C5
4011	A7
4012	D5
4013	G10
4015	E7
4016	E8
4112	A7
4301	E1
4302	F3
4303	E4
4304	E1
4305	F3
4460	B4
4471	B4
4472	B4
4475	B4
4476	B4
4477	A6
4501	C6
4502	C6
4503	C6
4504	C6
4505	D6
4507	C6
4508	C6
4601	C8
4602	A4
4603	A7
4612	A6
4664	B4
4701	D10
4702	E10
4703	E9
4704	D8
4705	E10
4711	E9
4712	G5
4759	G10
4760	F9
4761	F10
4762	F9
4763	F9
4764	G9
4765	E9
4767	F9
4768	F9
4769	**E10**
4831	G8
4832	B10
4833	A8
4834	B7
4835	C7
4837	B7
4838	A7
4839	A8
4840	B3
4841	A3
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4903	A9
4904	C10
4905	A9
4907	D10
4908	D10
4911	A3
4912	G6
4913	C7
4914	B10
4915	C10
4916	C10
4918	F1
4950	G9
4951	G10
5307	E1
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5605	A6
5703	C10
5709	E9
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5906	G9
6314	E1
6317	E1
6320	F1
6321	E1
6323	F1
6324	F1
6601	B4
6602	A4
6651	B8
6701	D9
6702	E10
6761	F9
6802	A3
6803	A2
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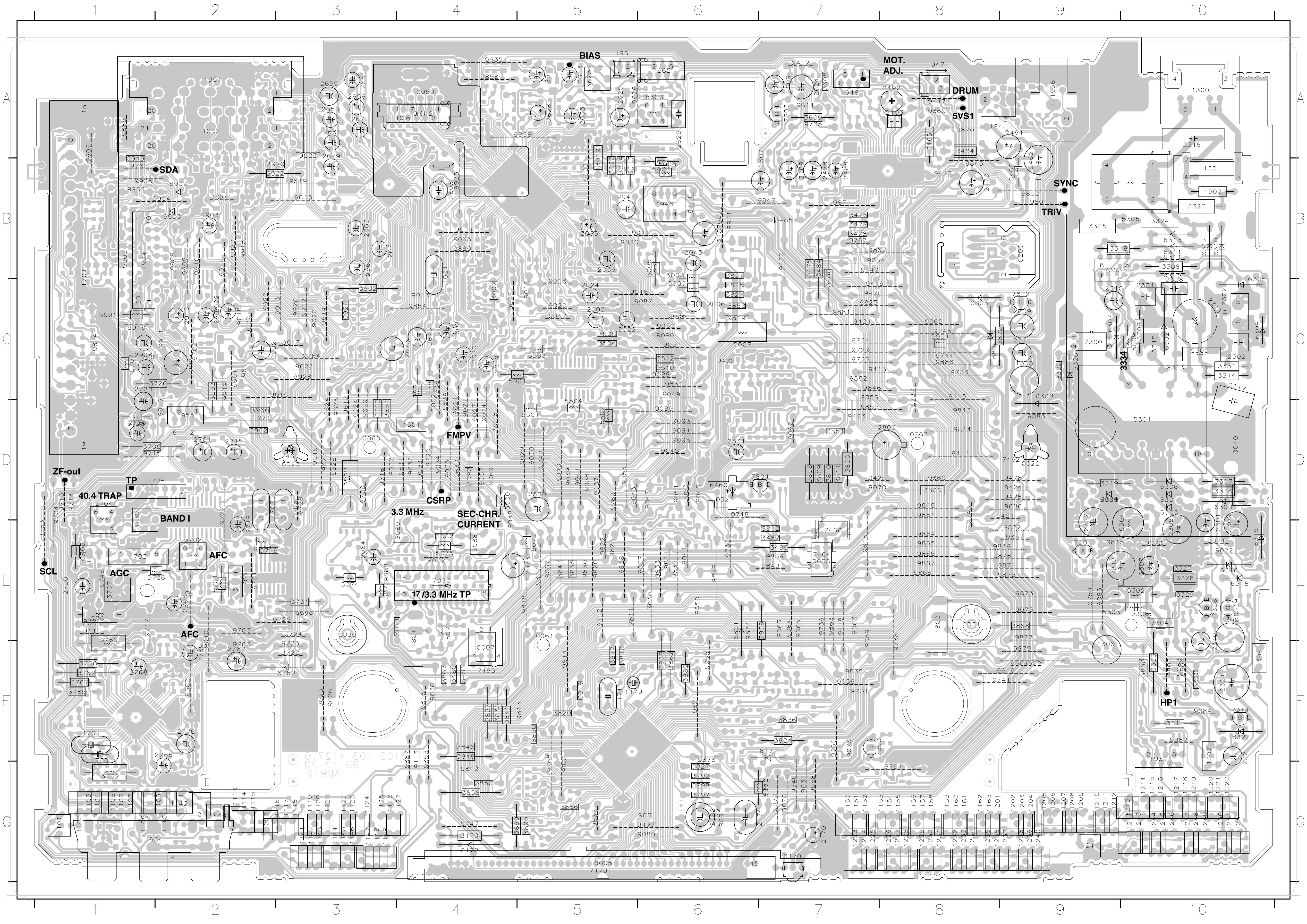
6904	B9
6905	B9
6906	B9
6907	B9
6908	B9
6909	A10
6910	A10
6911	G10
6912	G10
6913	A2
7002	B7
7003	B5
7004	B7
7005	C7
7006	C6
7008	B6
7009	B5
7010	A6
7071	F7
7073	D8
7075	E7
7077	E8
7172	F5
7173	G4
7305	F1
7306	E2
7307	F1
7309	E1
7310	F4
7311	F1
7313	F1
7315	F4
7316	F3
7351	G3
7463	B3
7501	C6
7502	C6
7503	C6
7530	D4
7531	C4
7532	C4
7601	A4
7602	A7
7604	A6
7606	B4
7607	A6
7608	A6
7650	B8
7701	E9
7702	E10
7703	D9
7704	E9
7705	D9
7706	E10
7760	F10
7761	F10
7800	F5
7801	D2
7802	E5
7803	D4
7807	E5
7808	D5
7809	E5
7810	C4
7811	F1
7818	B5
7899	F6
7905	B9
7906	C9
7907	B10
7908	B10
7909	B10
7910	F4
7911	B9
7912	F4
7913	B9
7914	F5
7917	C9
9759	E9

Engineer's remarks:

7.2 Mother board - component side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BIAS
MOT.
ADJ.
DRUM
5VS1
SYNC
TRIV
SDA
FMPV
ZF-out
TP
40.4 TRAP
BAND I
CSRP
3.3 MHz
SEC-CHR.
CURRENT
SCL
AGC
AFC
AFC
17 /3.3 MHz TP
3334
HP1

0005	G5
0007	F4
0008	E7
0020	D3
0021	D6
0022	D9
0030	E3
0031	E8
0040	D10
0050	A4
0060	D3
0061	E5
0062	D8
0200	B9
1001	B4
1101	G1
1102	G1
1103	G1
1104	G1
1105	G1
1106	G1
1107	G1
1108	G1
1109	G2
1110	G2
1111	G2
1112	G2
1113	G2
1114	G2
1115	G2
1116	G3
1117	G3
1118	G3
1119	G3
1120	G3
1121	G3
1122	G3
1123	G3
1124	G3
1125	G3
1126	G3
1127	G4
1140	G2
1141	G3
1142	G3
1143	G3
1144	G3
1145	G3
1146	G3
1147	G3
1148	G3
1149	G3
1150	G7
1151	G7
1152	G7
1153	G8
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1156	G8
1157	G8
1158	G8
1159	G8
1160	G8
1161	G8
1162	G8
1163	G8
1170	F5
1171	F5
1201	G8
1202	G9
1203	G9
1204	G9
1205	G9
1206	G9
1207	G9
1208	G9
1209	G9
1210	G9
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1230	G8
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1232	G8
1233	G8
1234	G8
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1238	G9
1239	G9
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1242	G10
1243	G10
1244	G10
1245	G10
1246	G10
1247	G10
1248	G10
1249	G10
1250	G10
1251	G10
1252	G10
1253	G2
1300	A10
1301	B10
1302	B10
1304	F10
1306	F9
1307	F10
1308	C9
1309	E10
1501	D4
1701	B1
1702	B1
1703	E1
1704	D2
1705	E2
1706	D3
1707	D2
1708	E1
1760	F1
1761	F1
1801	E4
1802	E8
1911	A4
1912	A4
1941	A8
1946	B6
1947	A8
1948	A7
1951	A2
1952	A2
1954	G1
1955	D2
1956	A9
1961	A5
1965	A6
1969	F9
1982	F10
2003	C5
2006	C6
2019	C4
2020	C4
2022	C5
2024	C5
2035	B5
2036	B5
2041	B5
2043	B6
2073	E5
2084	E3
2170	G7
2172	G6
2174	G7
2182	G6
2301	E10
2302	C10
2304	C10
2305	E10
2307	E10
2308	C10
2309	E10
2310	C9
2311	C9
2312	E9
2313	E9
2316	A10
2317	C10
2318	C10
2319	F10
2321	F10
2324	F10
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2462	B9
2470	B8
2478	B7
2481	B7
2487	B6
2488	B7
2489	B7
2490	B7
2492	A8
2493	A8
2500	D5
2531	D6
2602	C4
2603	B4
2607	B7
2609	A7
2610	A5
2613	A5
2620	A5
2624	A7
2625	A6
2628	A5
2633	A5
2650	A3
2651	A3
2655	A3
2656	A3
2660	B3
2663	B3
2671	B3
2672	A3
2673	C4
2675	C4
2679	A3
2681	A3
2701	D2
2703	C1
2706	E2
2715	D2
2719	E2
2720	C1
2726	D1
2766	F2
2768	F1
2769	F2
2776	F2
2782	F2
2790	E1
2803	D8
2809	C9
2902	C2
2903	B2
2904	C2
2908	C1
2915	C2
2922	C2
2923	C2
3002	C4
3013	B5
3019	A5
3022	B5
3024	B5
3071	E4
3082	E4
3088	E4
3089	E4
3092	D4
3170	G4
3302	C9
3307	D10
3308	B10
3309	C10
3311	F10
3314	C10
3315	C10
3316	D10
3318	B9
3319	D9
3320	F10
3324	B10
3325	B9
3326	B10
3327	E10
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3329	E10
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3333	F10
3464	A8
3465	A8
3475	B7
3476	B7
3477	B7
3478	B7
3480	F4
3481	F4
3482	E7
3484	B7
3485	B7
3486	B7
3489	E7
3504	C5
3505	C5
3510	C6
3512	C6
3551	D7
3602	C3
3608	A7
3609	A7
3625	A5
3651	D3
3652	D3
3705	D1
3707	E1
3716	E2
3726	C2
3730	E1
3731	E3
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3766	F1
3767	F1
3769	F1
3797	G6
3798	G6
3799	G6
3800	D8
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3805	D7
3808	D7
3809	D7
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3812	E7
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3817	F5
3819	F5
3820	F5
3821	C6
3824	F7
3825	C6
3827	G6
3833	F4
3835	E5
3836	F7
3837	F4
3838	F6
3842	E5
3844	F4
3846	F4
3848	F4
3850	F5
3851	B6
3852	C6
3856	G4
3858	G4
3862	F6
3867	F4
3868	E9
3880	F10
3882	F6
3886	G5
3890	G5
3899	G4
3920	B2
3922	B2
3924	C3
3939	E7
3949	B1
3953	C2
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5000	C6
5001	C5
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5003	B6
5004	B6
5005	B6
5006	B6
5007	C6
5009	C10
5071	E4
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5073	E3
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5075	E4
5170	G7
5300	C10
5301	D10
5302	E10
5303	E9
5304	E10
5305	B10
5306	E10
5460	B9
5500	D4
5501	D5
5502	D5
5503	C5
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5600	A6
5650	D3
5651	C4
5701	E2
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5705	E1
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5710	E2
5760	E1
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5762	G1
5901	C1
5904	C8
6170	G7
6171	F7
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6308	C9
6309	D9
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6311	B10
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6326	C9
6460	D6
6760	F3
6801	E6
6804	C8
6805	C8
6902	B2
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7170	G5
7300	C9
7301	E9
7302	C10
7303	B9
7304	E10
7308	E10
7314	F10
7350	F7
7461	D3
7462	D9
7464	E7
7465	F4
7466	E7
7603	A7
7804	D7
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9002	F2
9003	F2
9004	F2
9005	F2
9006	F2
9007	G2
9010	E2
9011	B6
9012	C5
9013	C4
9014	D4
9015	C3
9016	C6
9017	C5
9018	C5
9019	D3
9020	C5
9021	D4
9022	D4
9023	B5
9024	D3
9025	F3
9026	F3
9027	D4
9028	D4
9029	D5
9030	D5
9031	G7
9032	E4
9033	D4
9034	D4
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9036	C6
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9038	D5
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9044	E6
9045	D6
9046	D6
9047	D6
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9049	C6
9050	C6
9051	D6
9052	D6
9053	D5
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9055	F6
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9061	G6
9062	C8
9063	E7
9064	E7
9065	E7
9066	E7
9067	E5
9068	B4
9069	D4
9070	D7
9071	E10
9072	E10
9073	E10
9074	D9
9075	E9
9076	F7
9077	C4
9078	G7
9079	G7
9080	G6
9082	F10
9083	F10
9084	F10
9085	E9
9086	D9
9087	C6
9088	C6
9089	D6
9090	C6
9091	C6
9092	D7
9093	D6
9094	D6
9095	D6
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9112	E5
9113	F4
9301	F9
9302	F9
9311	B10
9312	B10
9313	C10
9401	D9
9411	B6
9412	A7
9413	C7
9414	D8
9415	C8
9416	B8
9417	A8
9418	E7
9419	C7
9420	C7
9421	C7
9422	C6
9423	D7
9424	D9
9425	D7
9426	D9
9427	G6
9428	D9
9429	B6
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9602	F2
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9616	F9
9617	C2
9618	C2
9619	B3
9620	C3
9623	C3
9624	D3
9625	D3
9626	A5
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9628	D3
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9631	D4
9632	D3
9633	D4
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9635	A4
9636	C4
9637	G5
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9703	E2
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9738	F8
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9743	D8
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9745	C8
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9747	G4
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9763	E1
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9839	E7
9840	E7
9841	E6
9842	G7
9843	D8
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9845	B8
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9847	B7
9848	D8
9849	E9
9850	E6
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9853	F4
9854	C4
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9876	E9
9877	E9
9878	F6
9879	F9
9880	B4
9881	C7
9882	C7
9883	D9
9884	G5
9885	A1
9886	C8
9887	F4
9888	E3
9902	B1
9903	B1
9904	B2
9905	B1
9906	A1
9907	B2
9908	B2
9909	B2
9910	B2
9911	C2
9912	C3
9913	C3
9914	B2
9915	B2
9916	D2
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9919	C2
9920	B2
9921	B6
9922	C2
9923	A3
9924	B4
9925	B4
9926	C3
9927	C2
9928	C3
9929	E3

Engineer's remarks:

7.3 Power supply (PS)

0040 B5
1300 G2
1301 H3
1302 H5
1304 E14
1306 G12
1307 H10
1308 E10
1309 A13
2300 A10
2301 C11
2302 C7
2303 C6
2304 C8
2305 C10
2306 C13
2307 D10
2308 D7
2309 E11
2310 F5
2311 F10
2312 G10
2313 G11
2314 G13
2315 G10
2316 H4
2317 H9
2318 H7
2319 A14
2320 H12
2321 I10
2322 H12
2323 H13
2324 H11
2325 G10
2327 B12
2328 F9
3300 A11
3301 C12
3302 B10
3303 B10
3305 G4
3306 B11
3307 C10
3308 C5
3309 C7
3310 C12
3311 C12
3312 D4
3313 I11
3314 E6
3315 D8
3316 E10
3318 F4
3319 G9
3320 G13
3321 G13
3322 D5
3324 I8
3325 I9
3326 H5
3327 B12
3328 A12
3329 A12
3330 B12
3331 E6
3332 B13
3333 C12
3334 E8
3335 G12
3336 B11
3338 G11
3339 H13
3340 H11
3341 H10
3343 C14
3344 D14
3345 D15
3347 D4
3350 E13
3351 F12
3352 F12
3353 F13
4301 A9
4302 B14
4303 A14
4305 E13
5009 E8
5300 C7
5301 B8
5302 C12
5303 D12
5304 G11
5305 H5
5306 E12
5307 E11
5308 C10
6300 C11
6301 C10
6302 D7
6303 D10
6304 D7
6305 E7
6306 E10
6307 E6
6308 E10
6309 G10
6310 G6
6311 G7
6312 H6
6313 H7
6314 A9
6315 B11
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7305 D13
7306 G12
7307 G13
7308 A12
7309 B12
7310 D15
7311 H14
7313 H11
7314 H11
7315 D14
7316 C14
7350 E13
7351 F12
9000 H1
9001 H1
9002 H1
9003 H1
9004 H1
9005 I1
9006 I1
9007 I1
9301 G14
9302 H14
C300 G14
C301 I5
C303 I5
C304 I6
F300 G4
F301 C5
F302 C5
F303 C6
F304 C6
F305 C7
F306 C8
F307 C9
F308 C9
F309 D10
F310 A8
F311 A9
F312 A9
F313 C10
F314 C10
F315 C14
F316 C15
F317 C11
F318 C11
F319 C12
F320 C13
F321 C14
F322 D11
F323 D11
F324 E12
F325 E13
F326 E9
F327 E10
F328 E10
F329 E10
F330 E10
F331 E9
F332 E11
F333 F13
F334 I13
F335 H10
F336 H10
F337 I10
F338 D8
F339 D6
F340 E5
F341 A15
F342 E6
F343 A15
F344 F3
F345 F4
F346 F4
F347 F5
F348 G2
F349 G3
F350 H2
F351 H3
F352 H3
F353 H4
F354 H5
F355 H6
F356 G6
F357 G5
F358 H8
F359 I8
F360 I9
F361 H9
F362 G9
F363 G9
F364 G10
F365 G10
F366 G10
F367 E8
F368 G11
F369 G11
F370 G13
F371 G13
F372 G14
F373 H14
F374 F13
F375 F13
F376 E14
F377 A12
F378 B15
F379 G3
F380 H6
F381 G9
F382 E11
F385 E10
F386 E10
F387 A13
F388 A13
F389 A12
F390 E15
F391 E14
I301 C7
I302 A10
I303 A10
I304 A11
I305 G12
I306 H11
I307 C11
I308 C12
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I310 G13
I311 H12
I312 H13
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I314 A12
I315 B11
I316 B12
I317 B13
I318 F12
I319 C14
I320 D14
I321 D15
I322 G12
I323 G11
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I328 F13
I329 E14
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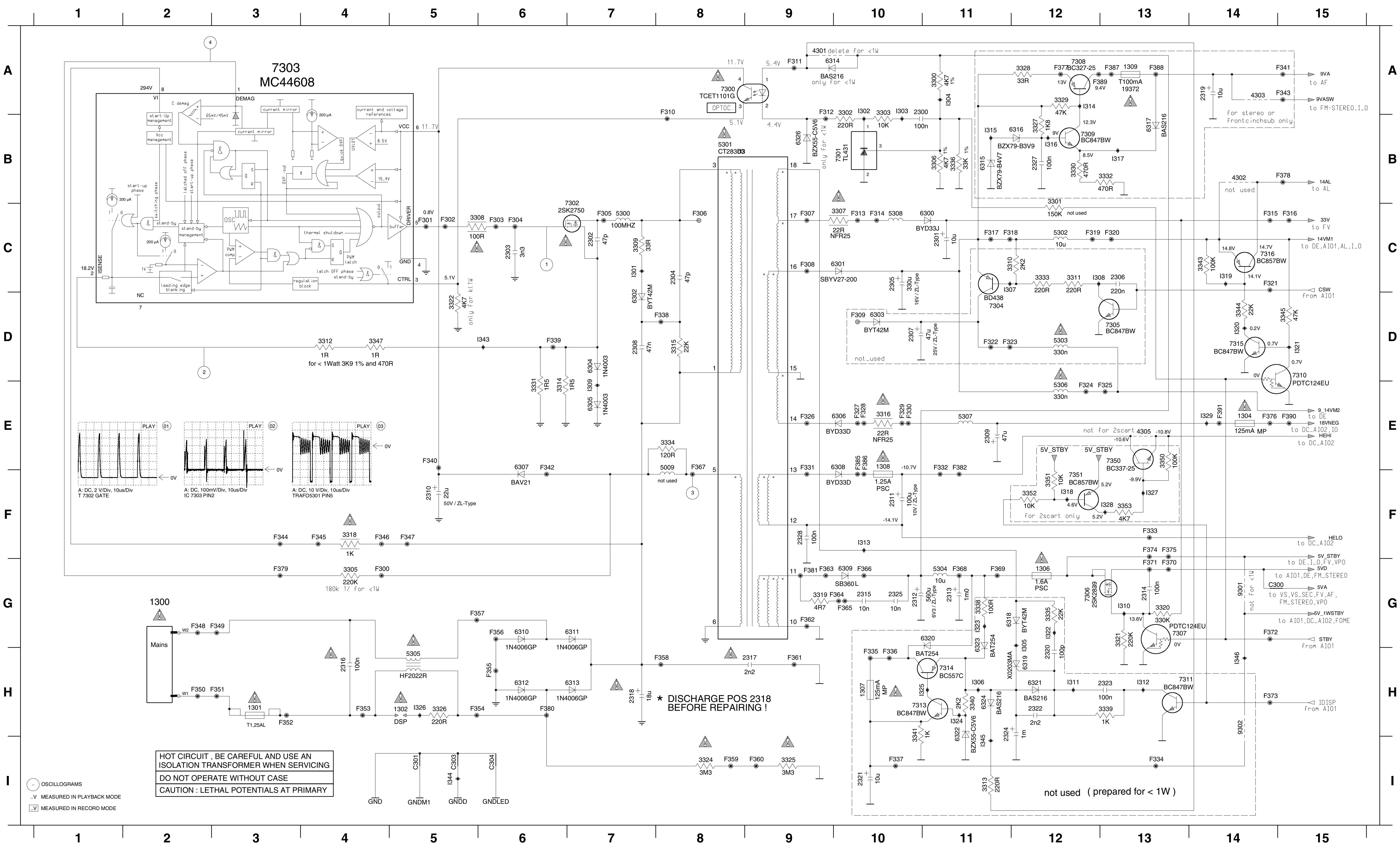
I344 I5
I345 I11
I346 H14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A
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G
H
I
7303
MC44608
DEMAG
VCC
DRIVER
GND
CTRL
ISENSE
NC
VI
294V
18.2V
0.8V
5.1V
6 11.7V
start-up management
Vcc management
C demag
65mV/45mV
current mirror
current and voltage references
UVLO1
quick OVP
OVP-out
8.5V
15.4V
OSC
PWM comp
PWM latch
thermal shutdown
buffer
output
stand-by
stand-by management
switching phase
start-up phase
Latched off phase
latch OFF phase stand-by
regulation block
leading edge blanking
200 μA
7300
TCET1101G
OPTOC
7301
TL431
7302
2SK2750
5301
CT283D3
7304
BD438
7305
BC847BW
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PDTC124EU
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BC557C
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BC857BW
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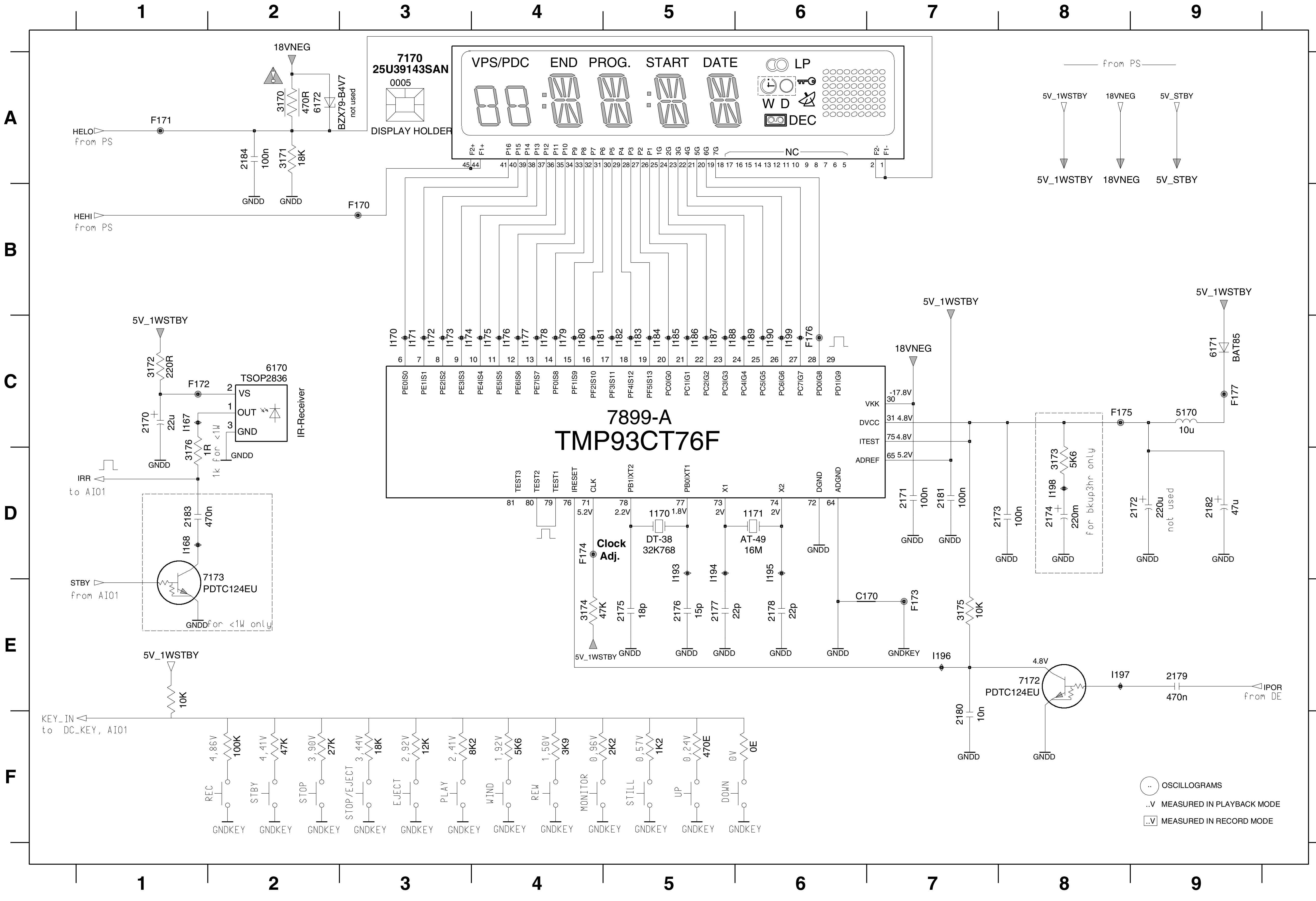
Mains
1301
T1,25AL
1302
DSP
5305
HF2022R
1304
125mA MP
1306
1.6A PSC
1307
125mA MP
1308
1.25A PSC
1309
T100mA 19372
6310
6311
6312
6313
1N4006GP
3312 1R
3347 1R
for < 1Watt 3K9 1% and 470R
3305 220K
180k 1/ for <1W
3318 1K
2318 18u
DISCHARGE POS 2318 BEFORE REPAIRING !
4301 delete for <1W
only for <1W
only for k11W
not used
not_used
for stereo or frontcinchsub only
not for 2scart
for 2scart only
5V_STBY
not for <1W
9VA to AF
9VASW to FM-STEREO,I_O
14AL to AL
33V to FV
14VM1 to DE,AIO1,AL,I_O
CSW from AIO1
9_14VM2 to DE
18VNEG to DC_AIO2,IO
HEHI to DC_AIO2
HELO to DC_AIO2
5V_STBY to DE,I_O,FV,VPO
5VD to AIO1,DE,FM_STEREO
5VA to VS,VS_SEC,FV,AF, FM_STEREO,VPO
5V_1WSTBY to AIO1,DC_AIO2,FOME
STBY from AIO1
IDISP from AIO1
not used (prepared for < 1W)
PLAY 01
A: DC, 2 V/Div, 10us/Div
T 7302 GATE
PLAY 02
A: DC, 100mV/Div, 10us/Div
IC 7303 PIN2
PLAY 03
A: DC, 10 V/Div, 10us/Div
TRAFO5301 PIN5
0V
GND
GNDM1
GNDD
GNDLED
C301
C303
C304
I344
OSCILLOGRAMS
..V MEASURED IN PLAYBACK MODE
..V MEASURED IN RECORD MODE

HOT CIRCUIT , BE CAREFUL AND USE AN ISOLATION TRANSFORMER WHEN SERVICING

DO NOT OPERATE WITHOUT CASE

CAUTION : LETHAL POTENTIALS AT PRIMARY

7.4 Display control (AIO2)

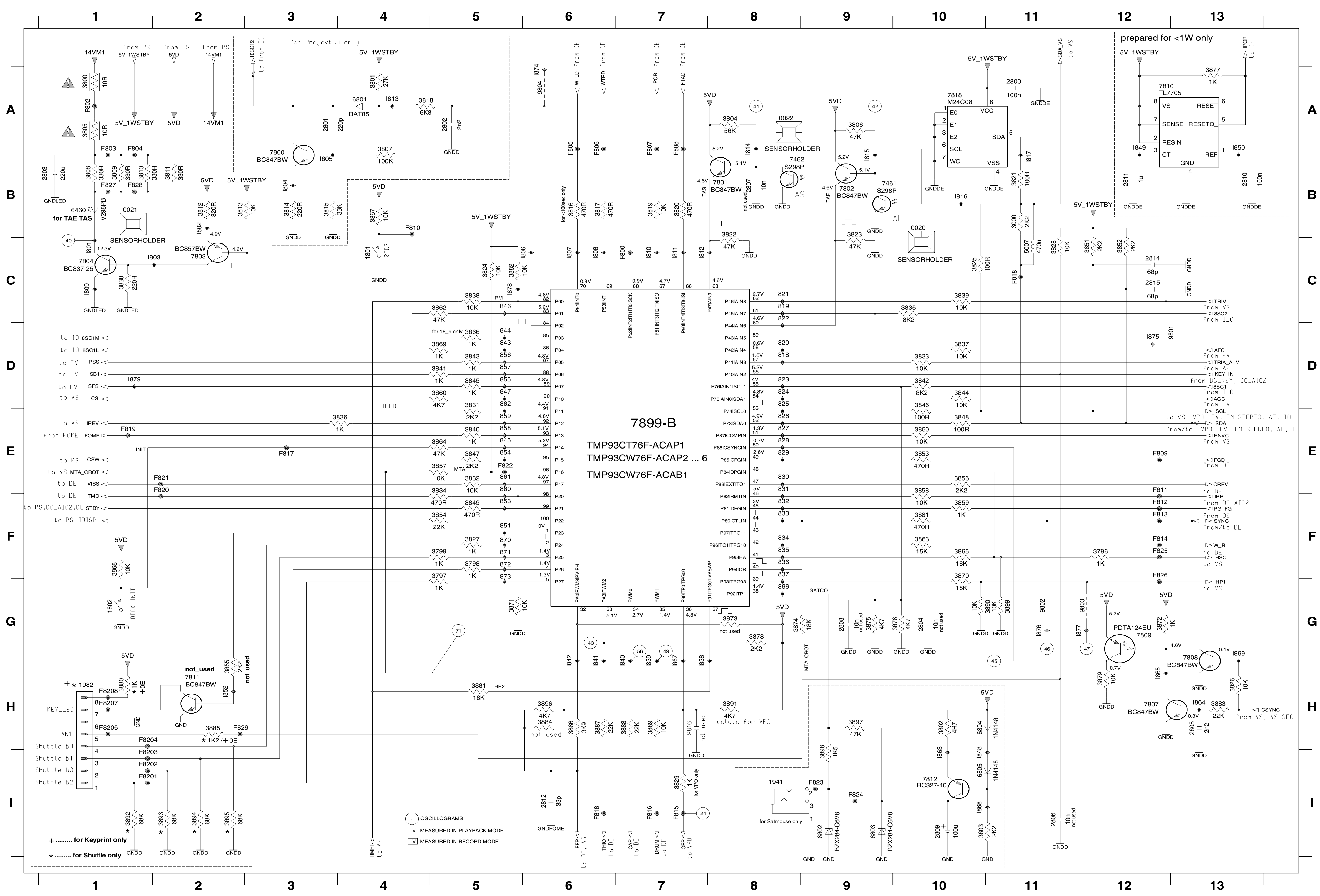

1
2
3
4
5
6
7
8
9
A
B
C
D
E
F
HELO from PS
HEHI from PS
F171
F170
18VNEG
3170
470R
6172
BZX79-B4V7
not used
2184
100n
3171
18K
GNDD
7170
25U39143SAN
0005
DISPLAY HOLDER
VPS/PDC
END
PROG.
START
DATE
LP
W D
DEC
F2+
F1+
P16
P15
P14
P13
P12
P11
P10
P9
P8
P7
P6
P5
P4
P3
P2
P1
1G
2G
3G
4G
5G
6G
7G
NC
F2-
F1-
from PS
5V_1WSTBY
18VNEG
5V_STBY
5V_1WSTBY
3172
220R
F172
2170
22u
6170
TSOP2836
VS
OUT
GND
IR-Receiver
I167
3176
1R
1k for <1W
IRR to AIO1
2183
470n
I168
STBY from AIO1
7173
PDTC124EU
for <1W only
I170
I171
I172
I173
I174
I175
I176
I177
I178
I179
I180
I181
I182
I183
I184
I185
I186
I187
I188
I189
I190
I199
F176
PE0IS0
PE1IS1
PE2IS2
PE3IS3
PE4IS4
PE5IS5
PE6IS6
PE7IS7
PF0IS8
PF1IS9
PF2IS10
PF3IS11
PF4IS12
PF5IS13
PC0IG0
PC1IG1
PC2IG2
PC3IG3
PC4IG4
PC5IG5
PC6IG6
PC7IG7
PD0IG8
PD1IG9
7899-A
TMP93CT76F
VKK
DVCC
ITEST
ADREF
TEST3
TEST2
TEST1
IRESET
CLK
PB1IXT2
PB0IXT1
X1
X2
DGND
ADGND
-17.8V
4.8V
5.2V
2V
1.8V
2.2V
1170
DT-38
32K768
1171
AT-49
16M
F174
Clock Adj.
3174
47K
2175
18p
I193
2176
15p
I194
2177
22p
I195
2178
22p
C170
F173
GNDKEY
2171
100n
2181
100n
2173
100n
I198
3173
5K6
2174
220m
for bkup3hr only
F175
5170
10u
2172
220u
not used
2182
47u
6171
BAT85
F177
3175
10K
I196
2180
10n
4.8V
7172
PDTC124EU
I197
2179
470n
IPOR from DE
KEY_IN to DC_KEY, AIO1
10K
4,86V
100K
REC
4,41V
47K
STBY
3,90V
27K
STOP
3,44V
18K
STOP/EJECT
2,92V
12K
EJECT
2,41V
8K2
PLAY
1,92V
5K6
WIND
1,50V
3K9
REW
0,96V
2K2
MONITOR
0,57V
1K2
STILL
0,24V
470E
UP
0V
0E
DOWN
GNDKEY
OSCILLOGRAMS
..V MEASURED IN PLAYBACK MODE
..V MEASURED IN RECORD MODE

0005	A3
1170	D5
1171	D6
2170	C1
2171	D7
2172	D9
2173	D8
2174	D8
2175	E5
2176	E5
2177	E5
2178	E6
2179	E9
2180	F7
2181	D7
2182	D9
2183	D1
2184	A2
3170	A2
3171	A2
3172	C1
3173	D8
3174	E4
3175	E7
3176	D1
5170	C9
6170	C2
6171	C9
6172	A2
7170	A3
7172	E8
7173	E1
7899-A	C5
C170	E7
F170	B3
F171	A1
F172	C1
F173	E7
F174	D4
F175	C8
F176	C6
F177	C9
I167	C1
I168	D1
I170	C3
I171	C3
I172	C3
I173	C3
I174	C3
I175	C4
I176	C4
I177	C4
I178	C4
I179	C4
I180	C4
I181	C4
I182	C5
I183	C5
I184	C5
I185	C5
I186	C5
I187	C5
I188	C5
I189	C6
I190	C6
I192	D5
I193	D5
I194	D5
I195	D6
I196	E7
I197	E8
I198	D8
I199	C6

Interconnections:

AF page 65	AL page 64	AIO1page 58	AIO2 page 57	DE page 59	FM ST page 62	FM NIC page 63
FV page 61	FOME page 70	I/O page 69	PS page 56	VPO page 68	VS page 67	VS_S page 66

7.5 Central control (AIO1)


1 2 3 4 5 6 7 8 9 10 11 12 13
A B C D E F G H I
7899-B
TMP93CT76F-ACAP1
TMP93CW76F-ACAP2 ... 6
TMP93CW76F-ACAB1
7818 M24C08
7810 TL7705
prepared for <1W only
for Projekt50 only
7800 BC847BW
7801 BC847BW
7802 BC847BW
7803 BC857BW
7804 BC337-25
7807 BC847BW
7808 BC847BW
7809 PDTA124EU
7811 BC847BW
7812 BC327-40
7461 S298P
7462 S298P
6460 V298PB
for TAE TAS
6801 BAT85
6802 BZX284-C6V8
6803 BZX284-C6V8
6804 1N4148
6805 1N4148
0020 SENSORHOLDER
0021 SENSORHOLDER
0022 SENSORHOLDER
TAS
TAE
14VM1
5V_1WSTBY
5VD
from PS
to IO 8SC1M
to IO 8SC1L
to FV PSS
to FV SB1
to FV SFS
to VS CSI
to VS IREV
from FOME FOME
to PS CSW
to VS MTA_CROT
to DE VISS
to DE TMO
to PS,DC_AIO2,DE STBY
to PS IDISP
DECK_INIT
RECP
WTLD from DE
WTRD from DE
IPOR from DE
FTAD from DE
TRIV from VS
8SC2 from I_O
AFC from FV
TRIA_ALM from AF
KEY_IN from DC_KEY, DC_AIO2
8SC1 from I_O
AGC from FV
SCL to VS, VPO, FV, FM_STEREO, AF, IO
SDA from/to VPO, FV, FM_STEREO, AF, IO
ENVC from VS
FGD from DE
CREV to DE
IRR from DC_AIO2
PG_FG from DE
SYNC from/to DE
W_R to DE
HSC to VS
HP1 to VS
SDA_VS to VS
IPOR to DE
CSYNC from VS, VS_SEC
FFP to DE, VS
THIO to DE
CAP to DE
DRUM to DE
OFP to VPO
RMHI to AF
delete for VPO
for VPO only
not used
for Satmouse only
KEY_LED
AN1
Shuttle b4
Shuttle b1
Shuttle b3
Shuttle b2
1982
1941
+ .... for Keyprint only
★ .... for Shuttle only
OSCILLOGRAMS
V MEASURED IN PLAYBACK MODE
V MEASURED IN RECORD MODE

0020	B10
0021	B1
0022	A8
0030	I12
0031	I13
0060	I12
0061	I13
0062	I12
1801	C4
1802	G1
1941	I8
1982	H1
2800	A11
2801	A3
2802	A5
2803	B1
2804	G10
2805	H13
2806	I11
2807	B8
2808	G9
2809	I10
2810	B13
2811	B12
2812	I6
2814	C12
2815	C12
2816	H7
3000	B11
3796	F12
3797	F5
3798	F5
3799	F5
3800	A1
3801	A4
3802	H10
3803	I10
3804	A8
3805	A1
3806	A9
3807	A4
3808	B1
3809	B1
3810	B1
3811	B2
3812	B2
3813	B2
3814	B3
3815	B3
3816	B6
3817	B6
3818	A4
3819	B7
3820	B7
3821	B11
3822	B8
3823	B9
3824	C5
3825	C10
3826	H13
3827	F5
3828	C11
3829	I7
3830	C1
3831	D5
3832	E5
3833	D10
3834	E5
3835	C10
3836	E4
3837	D10
3838	C5
3839	C10
3840	E5
3841	D5
3842	D10
3843	D5
3844	D10
3845	D5
3846	D10
3847	E5
3848	E10
3849	F5
3850	E10
3851	C12
3852	C12
3853	E10
3854	F5
3855	H2
3856	E10
3857	E5
3858	E10
3859	F10
3860	D5
3861	F10
3862	C5
3863	F10
3864	E5
3865	F10
3866	D5
3867	B4
3868	F1
3869	D5
3870	F10
3871	G5
3872	G12
3873	G8
3874	G8
3875	G9
3876	G10
3877	A13
3878	G8
3879	H12
3880	H1
3881	H5
3882	C5
3883	H13
3884	H6
3885	H2
3886	H6
3887	H6
3888	H7
3889	H7
3890	G10
3891	H8
3892	I1
3893	I2
3894	I2
3895	I2
3896	H6
3897	H9
3898	I9
3899	G11
5007	C11
6460	B1
6801	A4
6802	I9
6803	I9
6804	H10
6805	I10
7461	B10
7462	B9
7800	B3
7801	B8
7802	B9
7803	C2
7804	C1
7807	H12
7808	G13
7809	G12
7810	A12
7811	H2
7812	I10
7818	A10
7899-B	E7
9801	D12
9802	G11
9803	G12
9804	A6
F018	C11
F800	C7
F802	A1
F803	A1
F804	A1
F805	A6
F806	A6
F807	A7
F808	A7
F809	E12
F810	B4
F811	E12
F812	F12
F813	F12
F814	F12
F815	I7
F816	I7
F817	E3
F818	I6
F819	E1
F820	E2
F8201	I1
F8202	I1
F8203	I1
F8204	H1
F8205	H1
F8207	H1
F8208	H1
F821	E2
F822	E5
F823	I9
F824	I9
F825	F12
F826	F12
F827	B1
F828	B1
F829	H2
I801	C1
I802	B2
I803	C2
I804	B3
I805	B3
I806	C6
I807	C6
I808	C6
I809	C1
I810	C7
I811	C7
I812	C7
I813	A4
I814	A8
I815	B9
I816	B10
I817	B11
I818	D8
I819	C8
I820	D8
I821	C8
I822	C8
I823	D8
I824	D8
I825	D8
I826	E8
I827	E8
I828	E8
I829	E8
I830	E8
I831	E8
I832	F8
I833	F8
I834	F8
I835	F8
I836	F8
I837	F8
I838	G7
I839	G7
I840	G7
I841	G6
I842	G6
I843	D5
I844	D5
I845	E5
I846	C5
I847	D5
I848	I10
I849	A12
I850	A13
I851	F5
I852	H2
I853	F5
I854	E5
I855	D5
I856	D5
I857	D5
I858	E5
I859	E5
I860	E5
I861	E5
I862	D5
I863	I10
I864	H13
I865	H12
I866	G8
I867	G7
I868	I10
I869	G13
I870	F5
I871	F5
I872	F5
I873	F5
I874	A6
I875	D12
I876	G11
I877	G12
I878	C5
I879	D1

Interconnections:

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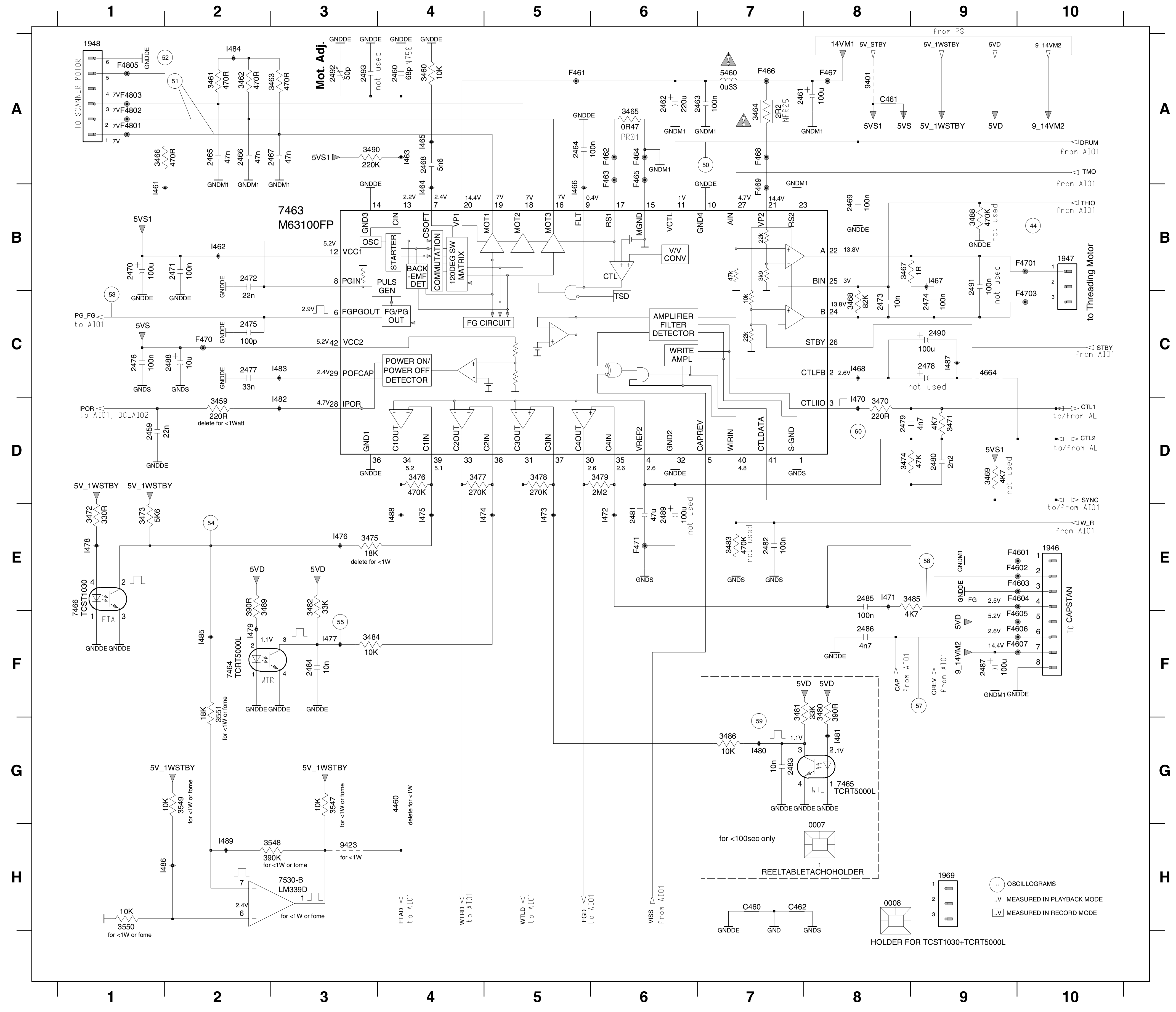
7.6 Deck control (DE)


1
2
3
4
5
6
7
8
9
10
A
B
C
D
E
F
G
H
1948
TO SCANNER MOTOR
F4805
7VF4803
7VF4802
7VF4801
7V
GNDDE
52
51
I484
3461 470R
3462 470R
3463 470R
2465 47n
2466 47n
2467 47n
GNDM1
3466 470R
I461
Mot. Adj.
2492 50p
2493 not used
2460 68p N750
3460 10K
GNDDE
5VS1
3490 220K
I463
I465
2468 5n6
I464
2.2V
2.4V
F461
2464 100n
I466
F462
F463
F464
F465
3465 0R47 PR01
GNDM1
2462 220u
2463 100n
5460 0u33
F466
3464 2R2 NFR25
F468
F469
2461 100u
F467
14VM1
5V_STBY
9401
C461
5VS1
5VS
5V_1WSTBY
5VD
9_14VM2
from PS
DRUM from AIO1
TMO from AIO1
THIO from AIO1
50
44
7463
M63100FP
GND3
CIN
CSOFT
VP1
MOT1
MOT2
MOT3
FLT
RS1
MGND
VCTL
GND4
AIN
VP2
RS2
OSC
STARTER
BACK -EMF DET
COMMUTATION
120DEG SW MATRIX
PULS GEN
FG/PG OUT
FG CIRCUIT
CTL
TSD
V/V CONV
AMPLIFIER FILTER DETECTOR
WRITE AMPL
POWER ON/ POWER OFF DETECTOR
VCC1
PGIN
FGPGOUT
VCC2
POFCAP
IPOR
GND1
C1OUT
C1IN
C2OUT
C2IN
C3OUT
C3IN
C4OUT
C4IN
VREF2
GND2
CAPREV
WIRIN
CTLDATA
S-GND
BIN
STBY
CTLFB
CTLI/O
5VS1
2470 100u
2471 100n
I462
2472 22n
53
PG_FG to AIO1
5VS
2475 100p
F470
2476 100n
2488 10u
2477 33n
I483
I482
IPOR to AIO1, DC_AIO2
3459 220R
delete for <1Watt
2459 22n
GNDS
2469 100n
3488 470K not used
3467 1R
I467
2474 100n
2491 100n not used
F4701
F4703
1947
to Threading Motor
3468 82K
2473 10n
2490 100u
2478 not used
I487
4664
I468
STBY from AIO1
I470
3470 220R
60
2479 4n7
3471 4K7
CTL1 to/from AL
CTL2 to/from AL
3474 47K
2480 2n2
3469 4K7 not used
SYNC to/from AIO1
W_R from AIO1
3476 470K
3477 270K
3478 270K
3479 2M2
2481 47u
2489 100u not used
F471
3483 470K not used
2482 100n
I488
I475
I474
I473
I472
5V_1WSTBY
3472 330R
3473 5K6
54
I478
I476
3475 18K
delete for <1W
7466 TCST1030
FTA
5VD
3489 390R
3482 33K
55
I479
I477
3484 10K
2484 10n
7464 TCRT5000L
WTR
I485
58
1946
F4601
F4602
F4603
F4604
F4605
F4606
F4607
TO CAPSTAN
2485 100n
I471
3485 4K7
2486 4n7
2487 100u
CAP from AIO1
CREV from AIO1
57
3481 33K
3480 390R
59
3486 10K
I480
I481
2483 10n
7465 TCRT5000L
WTL
for <100sec only
0007
REELTABLETACHOHOLDER
3551 18K
for <1W or fome
5V_1WSTBY
3549 10K
3547 10K
I489
3548 390K
9423
for <1W
4460
delete for <1W
I486
7530-B LM339D
3550 10K
FTAD to AIO1
WTRD to AIO1
WTLD to AIO1
FGD to AIO1
VISS from AIO1
C460
C462
GNDDE
GND
GNDS
0008
HOLDER FOR TCST1030+TCRT5000L
1969
OSCILLOGRAMS
V MEASURED IN PLAYBACK MODE
V MEASURED IN RECORD MODE

0007	H8
0008	H8
0011	G9
1946	E10
1947	B10
1948	A1
1969	G8
2459	D1
2460	A4
2461	A7
2462	A6
2463	A7
2464	A5
2465	A2
2466	A2
2467	A3
2468	A4
2469	B8
2470	B1
2471	B2
2472	B2
2473	C8
2474	C9
2475	C2
2476	C1
2477	C2
2478	C9
2479	D8
2480	D9
2481	E6
2482	E7
2483	G7
2484	F3
2485	E8
2486	F8
2487	F9
2488	C2
2489	E6
2490	C9
2491	B9
2492	A3
2493	A3
3459	D2
3460	A4
3461	A2
3462	A2
3463	A3
3464	A7
3465	A6
3466	A1
3467	B8
3468	C8
3469	D9
3470	D8
3471	D9
3472	E1
3473	E1
3474	D8
3475	E3
3476	D4
3477	D4
3478	D5
3479	D6
3480	F8
3481	F7
3482	E3
3483	E7
3484	F3
3485	E9
3486	G7
3488	B9
3489	E2
3490	A3
3547	G3
3548	H3
3549	G2
3550	H1
3551	F2
4460	G4
4664	C9
5460	A7
7463	B3
7464	F2
7465	G8
7466	F1
7530-B	H3
9401	A8
9423	H3
C460	H7
C461	A8
C462	H7
F4601	E10
F4602	E10
F4603	E10
F4604	E10
F4605	F10
F4606	F10
F4607	F10
F461	A5
F462	A6
F463	A6
F464	A6
F465	A6
F466	A7
F467	A8
F468	A7
F469	B7
F470	C2
F4701	B10
F4703	C10
F471	E6
F4801	A1
F4802	A1
F4803	A1
F4805	A1
I461	B1
I462	B2
I463	A4
I464	B4
I465	A4
I466	B5
I467	B9
I468	C8
I470	D8
I471	E8
I472	E6
I473	E5
I474	E4
I475	E4
I476	E3
I477	F3
I478	E1
I479	F2
I480	G7
I481	G8
I482	D3
I483	C3
I484	A2
I485	F2
I486	H1
I487	C9
I488	E4
I489	H2

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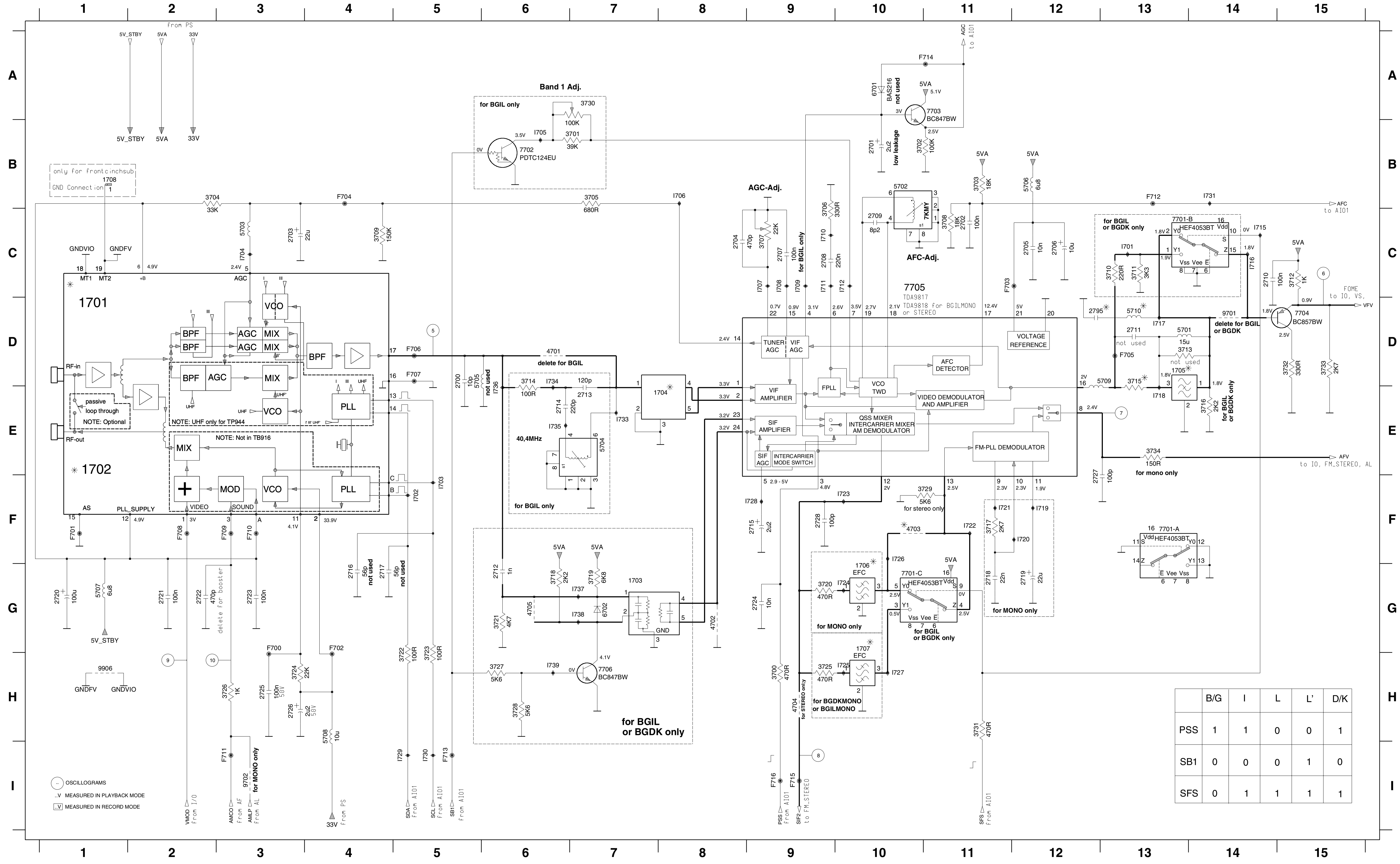
7.7 Variant List Frontend (FV)

	MONO						STEREO						
	PAL BG	PAL I UHF Only	PAL I Fullband	PAL,SEC DK (K1)	PAL, SEC, BG/DK	PAL, BG/I, SEC L/L’	PAL BG	PAL BG	PAL I Fullband	PAL,SEC DK (K1)	PAL,SEC BG/DK	PAL, SEC BG/I/DK, L/L’	
	/02	/05	/07	/60	/58	/39	/02	/13, /16	/07	/60	/58	/39	
Pos.	FM Interc.	FM Interc.	FM Interc.	FM Interc.	FM QSS	FM, AM QSS	FM Interc.	FM, NICAM QSS	FM, NICAM QSS	FM, NICAM QSS	FM, NICAM QSS	FM, AM, NICAM QSS	**FUNKTION**
1701	TP916MKII	TP944MKII	-	-	-	TP926MKII	TP916MKII	TP916MKII	-	-	-	TP926MKII	TUMOD PHILIPS
1701	TMRG1-108A	TMRB1-102A	TMRG1-110A	TMRG2-104A	TMRG1-203A	TMRG2-104A	TMRG1-108A	TMRG1-108A	TMRG1-110A	TMRG2-104A	TMRG1-203A	TMRG2-104A	TUMOD ALPS old
1701	TCBZ4-002A	TCBB1-001A	TCBZ4-002A	TCBZ4-004A	TCBZ4-002A	TCBZ4-004A	TCBZ4-002A	TCBZ4-002A	TCBZ4-002A	TCBZ4-004A	TCBZ4-002A	TCBZ4-004A	TUMOD ALPS new
1703	-	-	-	-	K9656M	K9656M	-	K9656M	K9656M	K9656M	K9656M	K9656M	QSS Sound OFW
1704	G1961M	J1980M	J1980M	K2955M	G3956M	K3953M	G1984M	G3956M	K3953M	G3956M	G3956M	K3953M	2. QSS Video OFW
1705	TPS 5,5	double TRAP TPW 6,0/6,5	double TRAP TPW 6,0/6,5	TPS 6,5	TPS 5,5	TPS 5,5	TPS 5,5	TPS 5,5	double TRAP TPW 6,0/6,5	TPS 6,5	TPS 5,5	TPS 5,5	Video-TRAP
1706	EFC 5,5	EFC 6,0	EFC 6,0	EFC 6,5	EFC 5,5	EFC 5,5	-	-	-	-	-	-	1. Sound-Filter
1707	-	-	-	-	EFC 6,5	EFC 6,0	-	-	-	-	-	-	2. Sound-Filter
2707	-	-	-	-	-	100n	-	-	-	-	-	100n	VIF AGC TDA 9818T only
2712	-	-	-	-	1n	1n	-	1n	1n	1n	1n	1n	QSS Sound OFW coupling
2713	-	-	-	-	-	120p	-	-	-	-	-	120p	40,4 trap
2714	-	-	-	-	-	220p	-	-	-	-	-	220p	40,4 trap
2718	22n	22n	22n	22n	22n	22n	-	-	-	-	-	-	Deemphasis MONO
2719	22u	22u	22u	22u	22u	22u	-	-	-	-	-	-	FM PLL Demodulator
2722	470p	470p	470p	470p	470p	-	470p	470p	470p	470p	470p	-	sift Audio Modul. IN
2795	-	-	-	-	-	-	15p	-	-	-	-	-	Video Trap widen
3710	-	-	-	-	220E	220E	-	-	-	-	220E	220E	Video Trap bypass
3711	-	-	-	-	3k3	3k3	-	-	-	-	3k3	3k3	Video-Amplitude Multistdt.
3714	-	-	-	-	-	100E	-	-	-	-	-	100E	40,4 trap
3715	330E	220E	220E	270E	270E	270E	330E	330E	220E	270E	270E	270E	Video trap resistor
3716	-	-	-	-	2k2	2k2	-	-	-	-	2k2	2k2	Video Trap resistor
3717	2k7	2k7	2k7	2k7	2k7	2k7	-	-	-	-	-	-	Deemphasis MONO
3718	-	-	-	-	-	2k2	-	-	-	-	-	2k2	Sound OFW switch
3719	-	-	-	-	-	6k8	-	-	-	-	-	6k8	Sound OFW switch
3720	470E	470E	470E	470E	470E	470E	-	-	-	-	-	-	EFC resistor
3721	-	-	-	-	-	4k7	-	-	-	-	-	4k7	Sound OFW switch
3725	-	-	-	-	470E	470E	-	-	-	-	-	-	2. EFC resistor
3726	1k	1k	1k	1k	1k	-	1k	1k	1k	1k	1k	-	Audio IN Modulator
3727	-	-	-	-	-	5k6	-	-	-	-	-	5k6	Sound OFW switch
3728	-	-	-	-	-	5k6	-	-	-	-	-	5k6	Sound OFW switch
3729	-	-	-	-	-	-	5k6	5k6	5k6	5k6	5k6	5k6	Mute FM Demodulator
3730	-	-	-	-	-	100K	-	-	-	-	-	100K	SEC Band 1 Adj.
4701	0E	0E	0E	0E	0E	-	0E	0E	0E	0E	0E	-	40,4 Falle Bypass
4702	0E	0E	0E	0E	-	-	0E	-	-	-	-	-	Intercarier switch
4703	0E	0E	0E	0E	-	-	-	-	-	-	-	-	4053 Bypass
4704	-	-	-	-	-	-	0E	0E	0E	0E	0E	0E	SIF zu MSP
4705	-	-	-	-	0E	-	-	0E	0E	0E	0E	-	QSS OFW BG/DK Select.
5701	15uH	10uH	10uH	15uH	15uH	15uH	15uH	15uH	10uH	15uH	15uH	15uH	Video Trap Spule
5704	-	-	-	-	-	41645	-	-	-	-	-	41645	40,4 trap
5710	-	-	-	-	-	-	39u	-	-	-	-	-	Video trap widen
6702	-	-	-	-	-	BA792	-	-	-	-	-	BA792	Sound OFW switch
7701	-	-	-	-	HEF4053	HEF4053	-	-	-	-	HEF4053	HEF4053	EFC / TRAP switch
7702	-	-	-	-	-	PDTC124EU	-	-	-	-	-	PDTC124EU	AFC L’
7705	TDA 9817 T	TDA 9817 T	TDA 9817 T	TDA 9817 T	TDA 9817 T	TDA 9818 T	TDA 9817 T	TDA 9817 T	TDA 9817 T	TDA 9817 T	TDA 9817 T	TDA 9818 T	AV Demodulator
7706	-	-	-	-	-	BC847BW	-	-	-	-	-	BC847BW	Sound OFW switch
9701	0E	0E	0E	0E	-	-	0E	0E	0E	0E	-	-	4053 Bypass
9702	0E	0E	0E	0E	0E	0E	-	-	-	-	-	-	MONO Audio to Modulator

7.8 Frontend (FV)

1701 D1
1702 E1
1703 G7
1704 E7
1705 D13
1706 G10
1707 G10
1708 C1
2700 D5
2701 B10
2702 C11
2703 C3
2704 C8
2705 C12
2706 C12
2707 C9
2708 C9
2709 C10
2710 C14
2711 D13
2712 G6
2713 E7
2714 E6
2715 F9
2716 G4
2717 G4
2718 G11
2719 G12
2720 G1
2721 G2
2722 G2
2723 G3
2724 G9
2725 H3
2726 H3
2727 F12
2728 F9
2795 D12
3700 H9
3701 B7
3702 B10
3703 B11
3704 B2
3705 B7
3706 C9
3707 C9
3708 C11
3709 C4
3710 C13
3711 C13
3712 C15
3713 D13
3714 D6
3715 D13
3716 E14
3717 F11
3718 G6
3719 G7
3720 G9
3721 G6
3722 H5
3723 H5
3724 H3
3725 H9
3726 H3
3727 H6
3728 H6
3729 F11
3730 A7
3731 H11
3732 D15
3733 D15
3734 E13
4701 D6
4702 G8
4703 F10
4704 H9
4705 G6
5701 D13
5702 B10
5703 C3
5704 E7
5705 D5
5706 B12
5707 G1
5708 H4
5709 D12
5710 D13
6701 A10
6702 G7
7701-A F13
7701-B C14
7701-C G11
7702 B6
7703 A11
7704 D15
7705 C10
7706 H7
9701 D14
9702 I3
9906 H1
F700 G3
F701 F1
F702 G4
F703 C11
F704 B4
F705 D13
F706 D5
F707 D5
F708 F2
F709 F3
F710 F3
F711 I3
F712 B13
F713 I5
F714 A11
F715 I9
F716 I9
I701 C13
I702 F5
I703 F5
I704 C3
I705 B6
I706 B8
I707 C9
I708 C9
I709 C9
I710 C9
I711 C9
I712 C10
I715 C14
I716 C14
I717 D13
I718 E13
I719 F12
I720 F12
I721 F11
I722 F11
I723 F10
I724 G10
I725 H10
I726 F10
I727 H10
I728 F9
I729 I5
I730 I5
I731 B14
I733 E7
I734 D6
I735 E6
I736 E6
I737 G7
I738 G7
I739 H6


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
A
B
C
D
E
F
G
H
I
from PS
5V_STBY
5VA
33V
only for frontcinchsub
GND Connection
1708
GNDVIO
GNDFV
MT1
MT2
1701
1702
RF-in
RF-out
passive
loop through
NOTE: Optional
BPF
AGC
MIX
VCO
PLL
UHF
NOTE: UHF only for TP944
NOTE: Not in TB916
MOD
VIDEO
SOUND
AS
PLL_SUPPLY
3704
33K
F704
3705
680R
3709
150K
5703
2703
22u
Band 1 Adj.
for BGIL only
3730
100K
3701
39K
7702
PDTC124EU
I705
I706
6701
BAS216
not used
2701
2u2
low leakage
7703
BC847BW
3702
100K
F714
AGC
to AI01
AGC-Adj.
2704
470p
3707
22K
2707
100n
for BGIL only
3706
330R
2708
220n
5702
7KMY
2709
8p2
AFC-Adj.
3708
18K
2702
100n
3703
18K
5706
6u8
2705
10n
2706
10u
F703
7705
TDA9817
TDA9818 for BGILMONO
or STEREO
TUNER AGC
VIF AGC
VIF AMPLIFIER
SIF AMPLIFIER
SIF AGC
INTERCARRIER MODE SWITCH
FPLL
VCO TWD
AFC DETECTOR
VIDEO DEMODULATOR AND AMPLIFIER
QSS MIXER INTERCARRIER MIXER AM DEMODULATOR
VOLTAGE REFERENCE
FM-PLL DEMODULATOR
F712
I731
AFC
to AI01
7701-B
HEF4053BT
for BGIL
or BGDK only
3710
220R
3711
3K3
2795
5710
2711
not used
F705
5701
15u
3713
not used
1705
3715
3716
2K2
for BGIL
or BGDK only
9701
delete for BGIL
or BGDK
7704
BC857BW
3712
1K
2710
100n
3732
330R
3733
2K7
FOME
to IO, VS,
VFV
3734
150R
for mono only
2727
100p
AFV
to IO, FM_STEREO, AL
F706
F707
4701
delete for BGIL
2700
10p
5705
not used
3714
100R
I734
2713
120p
2714
220p
I735
40,4MHz
5704
for BGIL only
1704
I733
3729
5K6
for stereo only
4703
1706
EFC
3720
470R
for MONO only
1707
3725
470R
for BGDKMONO
or BGILMONO
7701-C
HEF4053BT
for BGIL
or BGDK only
3717
2K7
2718
22n
2719
22u
for MONO only
7701-A
HEF4053BT
2712
1n
3718
2K2
3719
6K8
6702
1703
GND
4705
3721
4K7
3727
5K6
7706
BC847BW
3728
5K6
for BGIL
or BGDK only
4702
2715
2u2
2728
100p
2724
10n
3700
470R
4704
for STEREO only
3731
470R
2720
100u
5707
6u8
2721
100n
2722
470p
delete for booster
2723
100n
F700
2725
100n
50V
3724
22K
2726
2u2
50V
F702
5708
10u
2716
56p
not used
2717
56p
not used
3722
100R
3723
100R
9906
GNDFV
GNDVIO
3726
1K
F711
9702
for MONO only
OSCILLOGRAMS
..V MEASURED IN PLAYBACK MODE
V MEASURED IN RECORD MODE
VMOD from I/O
AMCO from AF
AMLP from AL
33V from PS
SDA from AI01
SCL from AI01
SB1 from AI01
PSS from AI01
SIF2 to FM_STEREO
SFS from AI01
F716
F715

	B/G	I	L	L'	D/K
PSS	1	1	0	0	1
SB1	0	0	0	1	0
SFS	0	1	1	1	1

Interconnections:

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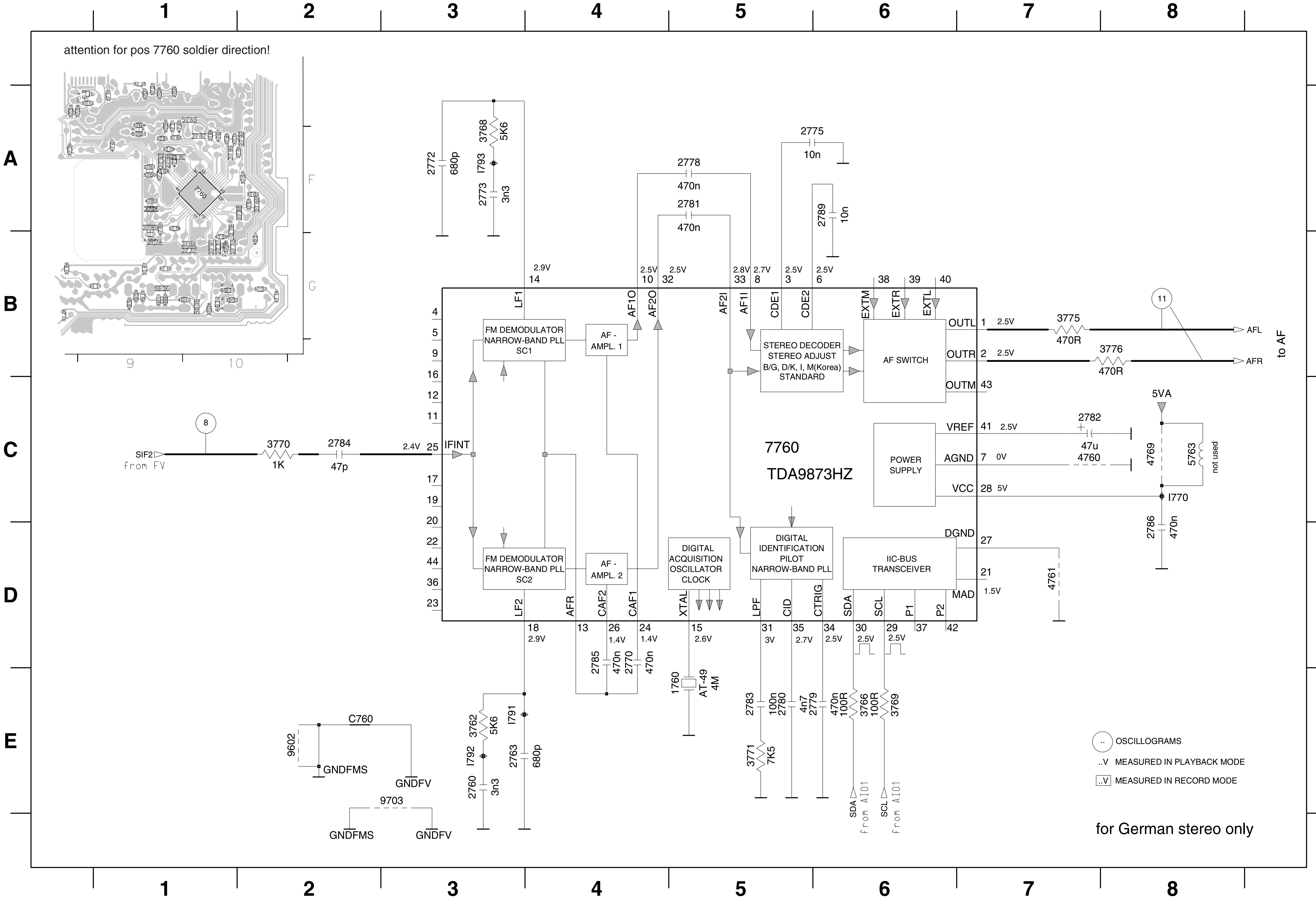
7.9 FM stereo (FM-ST)


attention for pos 7760 soldier direction!
1
2
3
4
5
6
7
8
A
B
C
D
E
F
G
9
10
7760
TDA9873HZ
FM DEMODULATOR NARROW-BAND PLL SC1
FM DEMODULATOR NARROW-BAND PLL SC2
AF - AMPL. 1
AF - AMPL. 2
STEREO DECODER STEREO ADJUST B/G, D/K, I, M(Korea) STANDARD
AF SWITCH
POWER SUPPLY
DIGITAL ACQUISITION OSCILLATOR CLOCK
DIGITAL IDENTIFICATION PILOT NARROW-BAND PLL
IIC-BUS TRANSCEIVER
LF1
LF2
AF1O
AF2O
AF2I
AF1I
CDE1
CDE2
EXTM
EXTR
EXTL
OUTL
OUTR
OUTM
VREF
AGND
VCC
DGND
MAD
IFINT
AFR
CAF2
CAF1
XTAL
LPF
CID
CTRIG
SDA
SCL
P1
P2
SIF2
from FV
8
3770
1K
2784
47p
2.4V
2772
680p
3768
5K6
I793
2773
3n3
2778
470n
2781
470n
2775
10n
2789
10n
3775
470R
3776
470R
11
AFL
AFR
to AF
5VA
2782
47u
4760
4769
5763
not used
I770
2786
470n
4761
2785
470n
2770
470n
1760
AT-49
4M
2783
100n
2780
4n7
2779
470n
3766
100R
3769
100R
3771
7K5
SDA
from AI01
SCL
from AI01
3762
5K6
I791
I792
2760
3n3
2763
680p
C760
9602
GNDFMS
GNDFV
9703
GNDFMS
GNDFV
.. OSCILLOGRAMS
..V MEASURED IN PLAYBACK MODE
..V MEASURED IN RECORD MODE
for German stereo only

1760	E5
2760	E3
2763	E3
2770	D4
2772	A3
2773	A3
2775	A5
2778	A5
2779	E6
2780	E5
2781	A5
2782	C7
2783	E5
2784	C2
2785	D4
2786	D8
2789	A6
3762	E3
3766	E6
3768	A3
3769	E6
3770	C2
3771	E5
3775	B7
3776	B8
4760	C7
4761	D7
4769	C8
5763	C8
7760	C5
9602	E2
9703	E3
C760	E2
I770	C8
I791	E3
I792	E3
I793	A3

Interconnections:

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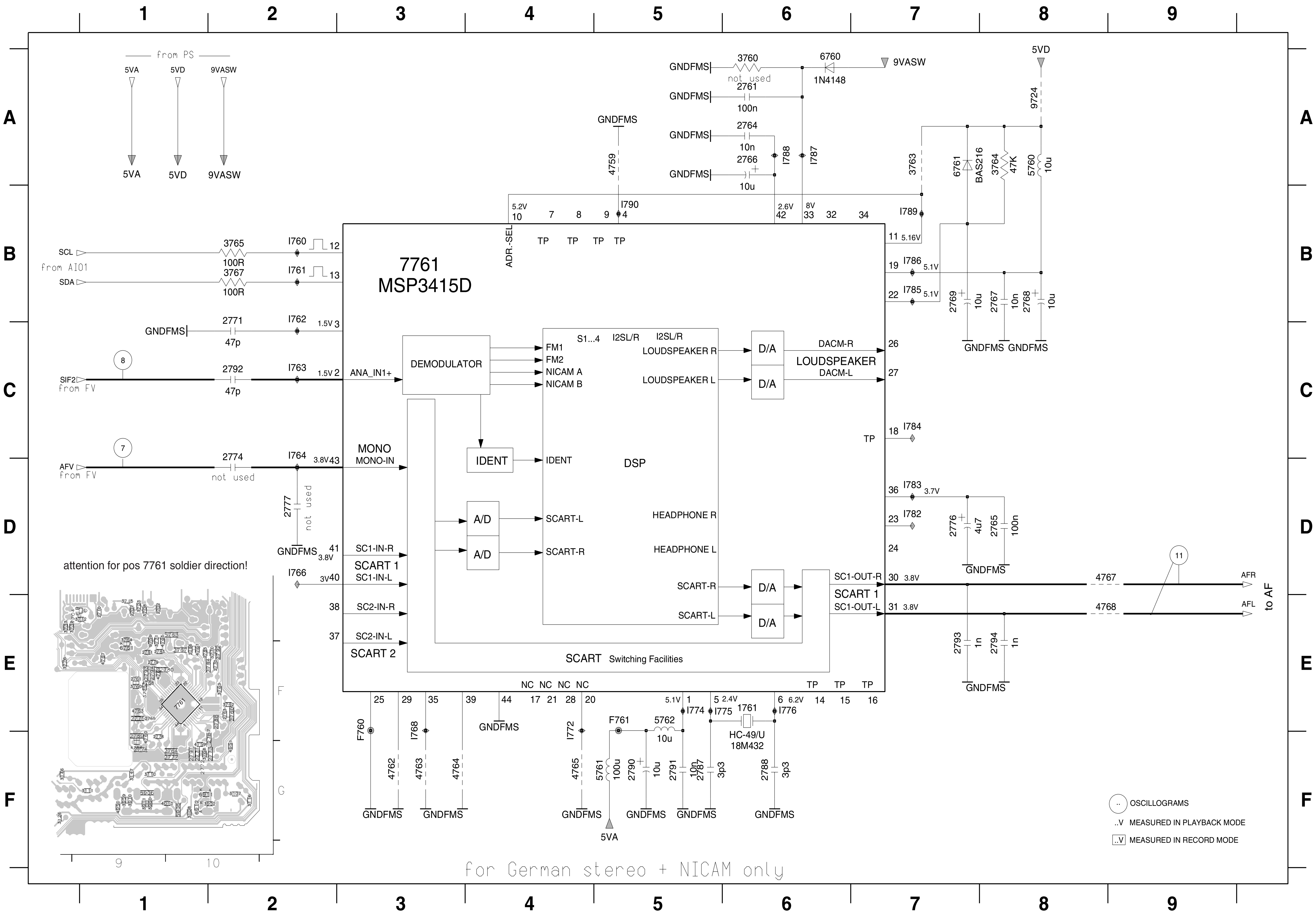
7.10 FM Stereo + Nicam (FM-ST-NIC)


1 2 3 4 5 6 7 8 9
A B C D E F
from PS
5VA
5VD
9VASW
SCL
SDA
from AIO1
3765 100R
3767 100R
I760 12
I761 13
GNDFMS
2771 47p
I762 1.5V 3
SIF2 from FV
8
2792 47p
I763 1.5V 2
AFV from FV
7
2774 not used
I764 3.8V 43
2777 not used
GNDFMS 3.8V 41
I766 3V 40
38
37
7761
MSP3415D
ANA_IN1+
MONO
MONO-IN
SC1-IN-R
SCART 1
SC1-IN-L
SC2-IN-R
SC2-IN-L
SCART 2
DEMODULATOR
IDENT
A/D
A/D
FM1
FM2
NICAM A
NICAM B
IDENT
SCART-L
SCART-R
S1...4
I2SL/R
I2SL/R
LOUDSPEAKER R
LOUDSPEAKER L
DSP
HEADPHONE R
HEADPHONE L
SCART-R
SCART-L
D/A
D/A
D/A
D/A
DACM-R
LOUDSPEAKER
DACM-L
SC1-OUT-R
SCART 1
SC1-OUT-L
SCART Switching Facilities
ADR.-SEL
TP TP TP TP
5.2V 10 7 8 9 4
I790
4759
GNDFMS
3760 not used
6760 1N4148
9VASW
2761 100n
2764 10n
2766 10u
I788
I787
2.6V 42
8V 33 32 34
3763
I789
11 5.16V
19 I786 5.1V
22 I785 5.1V
5VD
9724
6761 BAS216
3764 47K
5760 10u
2769 10u
2767 10n
2768 10u
GNDFMS GNDFMS
26
27
TP 18 I784
36 I783 3.7V
23 I782
24
2776 4u7
2765 100n
30 3.8V
31 3.8V
4767
4768
11
AFR
AFL
to AF
2793 1n
2794 1n
NC NC NC NC
TP TP TP
25 29 35 39 44 17 21 28 20
F760
I768
4762
4763
4764
I772
4765
5.1V 1 I774
5 2.4V I775
1761 HC-49/U 18M432
6 6.2V I776
14 15 16
F761
5762 10u
5761 100u
2790 10u
2791 10n
2787 3p3
2788 3p3
5VA
attention for pos 7761 soldier direction!
9 10
F
G
7761
.. OSCILLOGRAMS
..V MEASURED IN PLAYBACK MODE
..V MEASURED IN RECORD MODE
for German stereo + NICAM only

1761	E6
2761	A6
2764	A6
2765	D8
2766	A6
2767	B8
2768	B8
2769	B7
2771	C2
2774	D2
2776	D7
2777	D2
2787	F5
2788	F6
2790	F5
2791	F5
2792	C2
2793	E7
2794	E8
3760	A6
3763	A7
3764	A8
3765	B2
3767	B2
4759	A5
4762	F3
4763	F3
4764	F3
4765	F4
4767	D8
4768	E8
5760	A8
5761	F5
5762	E5
6760	A6
6761	A7
7761	B3
9724	A8
F760	E3
F761	E5
I760	B2
I761	B2
I762	B2
I763	C2
I764	C2
I766	D2
I768	E3
I772	E4
I774	E5
I775	E6
I776	E6
I782	D7
I783	D7
I784	C7
I785	B7
I786	B7
I787	A6
I788	A6
I789	B7
I790	B5

Interconnections:

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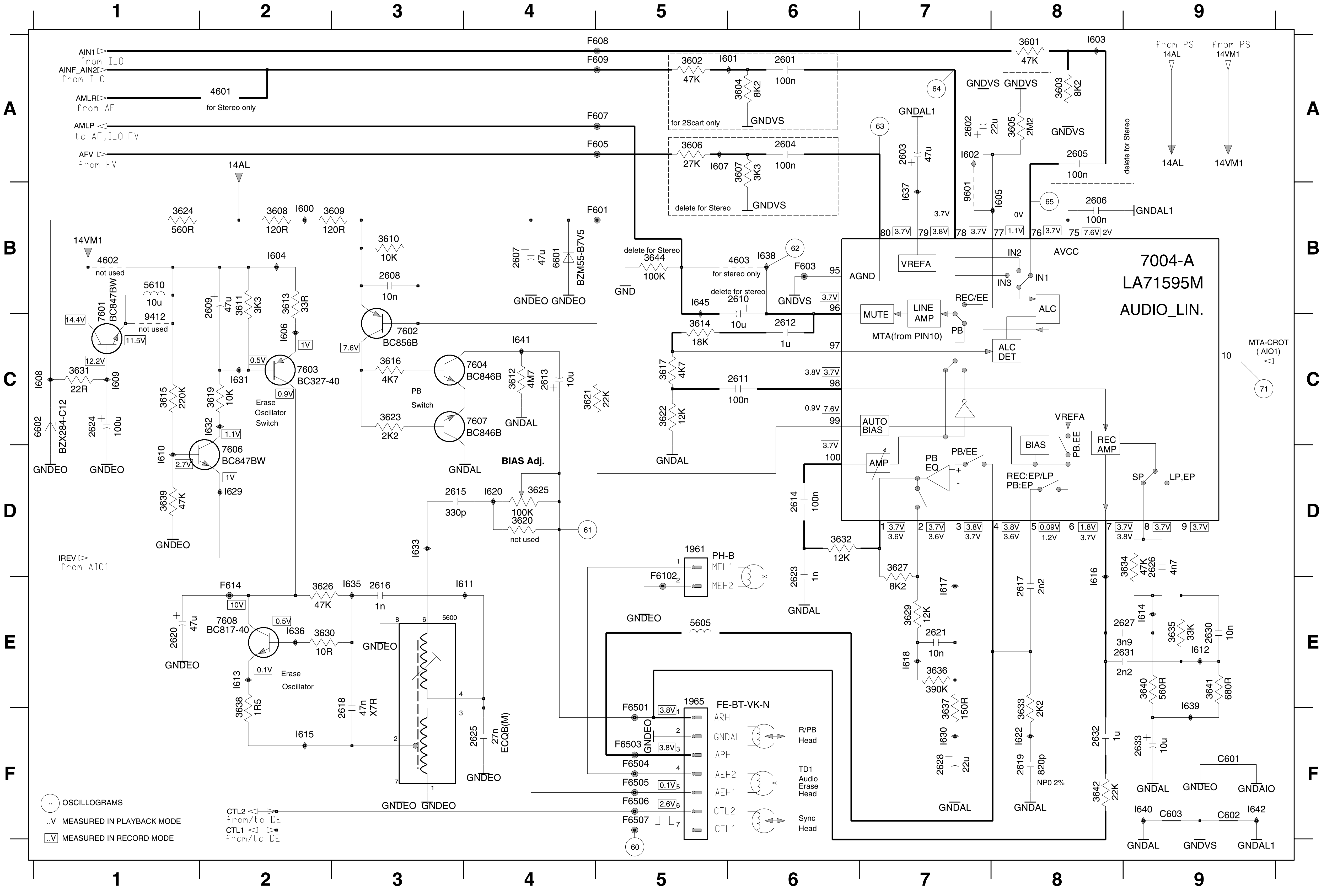
7.11 Audio Linear (AL)


1 2 3 4 5 6 7 8 9
A B C D E F
AIN1 from I_O
AINF_AIN2 from I_O
AMLR from AF
AMLP to AF,I_O,FV
AFV from FV
4601 for Stereo only
F608
F609
F607
F605
F601
3602 47K
I601
2601 100n
3604 8K2
GNDVS
for 2Scart only
3606 27K
I607
2604 100n
3607 3K3
delete for Stereo
3601 47K
I603
3603 8K2
2605 100n
delete for Stereo
from PS 14AL
from PS 14VM1
14AL
14VM1
GNDAL1
2603 47u
I637
2602 22u
3605 2M2
I602
9601
I605
0V
3.7V
2606 100n
GNDAL1
3624 560R
3608 120R
I600
3609 120R
14VM1
4602 not used
5610 10u
9412 not used
7601 BC847BW
14.4V
11.5V
12.2V
3631 22R
I608
I609
6602 BZX284-C12
2624 100u
GNDEO
3615 220K
2609 47u
3611 3K3
3613 33R
I604
I606
1V
I631
0.5V
7603 BC327-40
0.9V
Erase Oscillator Switch
3619 10K
I632
1.1V
7606 BC847BW
2.7V
I610
1V
I629
3639 47K
IREV from AIO1
3610 10K
2608 10n
7602 BC856B
7.6V
3616 4K7
7604 BC846B
PB Switch
3623 2K2
7607 BC846B
GNDAL
I641
3612 4M7
2613 10u
3621 22K
2607 47u
6601 BZM55-B7V5
BIAS Adj.
2615 330p
I620
3625 100K
3620 not used
61
I633
delete for Stereo
3644 100K
GND
4603 for stereo only
I638
62
F603
GNDVS
delete for stereo
2610 10u
I645
3614 18K
2612 1u
3617 4K7
2611 100n
3622 12K
7004-A
LA71595M
AUDIO_LIN.
AGND
AVCC
VREFA
MUTE
LINE AMP
MTA(from PIN10)
REC/EE
PB
IN1
IN2
IN3
ALC
ALC DET
AUTO BIAS
AMP
PB EQ
PB/EE
BIAS
VREFA
PB.EE
REC:EP/LP
PB:EP
REC AMP
SP
LP,EP
MTA-CROT (AIO1)
10
71
63
64
65
80 79 78 77 76 75
95 96 97 98 99 100
1 2 3 4 5 6 7 8 9
3.7V 3.8V 1.1V 7.6V 2V
3.6V 1.2V 3.8V
2614 100n
3632 12K
2623 1n
3627 8K2
3629 12K
I617
2621 10n
I618
3636 390K
3637 150R
I630
2628 22u
2617 2n2
3633 2K2
I622
2619 820p NP0 2%
I616
3634 47K
2626 4n7
I614
2627 3n9
2631 2n2
3635 33K
2630 10n
I612
3640 560R
3641 680R
I639
2632 1u
2633 10u
3642 22K
C601
C602
C603
I640
I642
GNDAIO
GNDVS
1961
PH-B
MEH1
MEH2
F6102
5605
1965
FE-BT-VK-N
ARH
GNDAL
APH
AEH2
AEH1
CTL2
CTL1
R/PB Head
TD1 Audio Erase Head
Sync Head
F6501
F6503
F6504
F6505
F6506
F6507
60
CTL2 from/to DE
CTL1 from/to DE
F614
10V
2620 47u
7608 BC817-40
0.5V
I636
0.1V
Erase Oscillator
I613
3638 1R5
I615
3626 47K
I635
2616 1n
I611
3630 10R
2618 47n X7R
5600
2625 27n ECQB(M)
OSCILLOGRAMS
..V MEASURED IN PLAYBACK MODE
..V MEASURED IN RECORD MODE

0010	E1
0200	F1
1961	D5
1965	E5
2601	A6
2602	A7
2603	A7
2604	A6
2605	A8
2606	B8
2607	B4
2608	B3
2609	B2
2610	B6
2611	C6
2612	C6
2613	C4
2614	D6
2615	D3
2616	E3
2617	E8
2618	F3
2619	F8
2620	E1
2621	E7
2623	E6
2624	C1
2625	F4
2626	D9
2627	E9
2628	F7
2630	E9
2631	E9
2632	F8
2633	F9
3601	A8
3602	A5
3603	A8
3604	A6
3605	A8
3606	A5
3607	A6
3608	B2
3609	B3
3610	B3
3611	B2
3612	C4
3613	B2
3614	C5
3615	C1
3616	C3
3617	C5
3619	C2
3620	D4
3621	C4
3622	C5
3623	C3
3624	B1
3625	D4
3626	E2
3627	D7
3629	E7
3630	E2
3631	C1
3632	D6
3633	F8
3634	D9
3635	E9
3636	E7
3637	F7
3638	E2
3639	D1
3640	E9
3641	E9
3642	F8
3644	B5
4601	A2
4602	B1
4603	B6
5600	E3
5605	E5
5610	B1
6601	B4
6602	C1
7004-A	B9
7601	C1
7602	C3
7603	C2
7604	C4
7606	D2
7607	C4
7608	E2
9412	C1
9601	B7
C601	F9
C602	F9
C603	F9
F601	B5
F603	B6
F605	A5
F607	A5
F608	A5
F609	A5
F6102	E5
F614	E2
F6501	F5
F6503	F5
F6504	F5
F6505	F5
F6506	F5
F6507	F5
I600	B2
I601	A6
I602	A7
I603	A8
I604	B2
I605	B8
I606	C2
I607	A5
I608	C1
I609	C1
I610	D1
I611	E4
I612	E9
I613	E2
I614	E9
I615	F2
I616	E8
I617	E7
I618	E7
I620	D4
I622	F8
I629	D2
I630	F7
I631	C2
I632	C2
I633	D3
I635	E3
I636	E2
I637	B7
I638	B6
I639	E9
I640	F9
I641	C4
I642	F9
I645	B5

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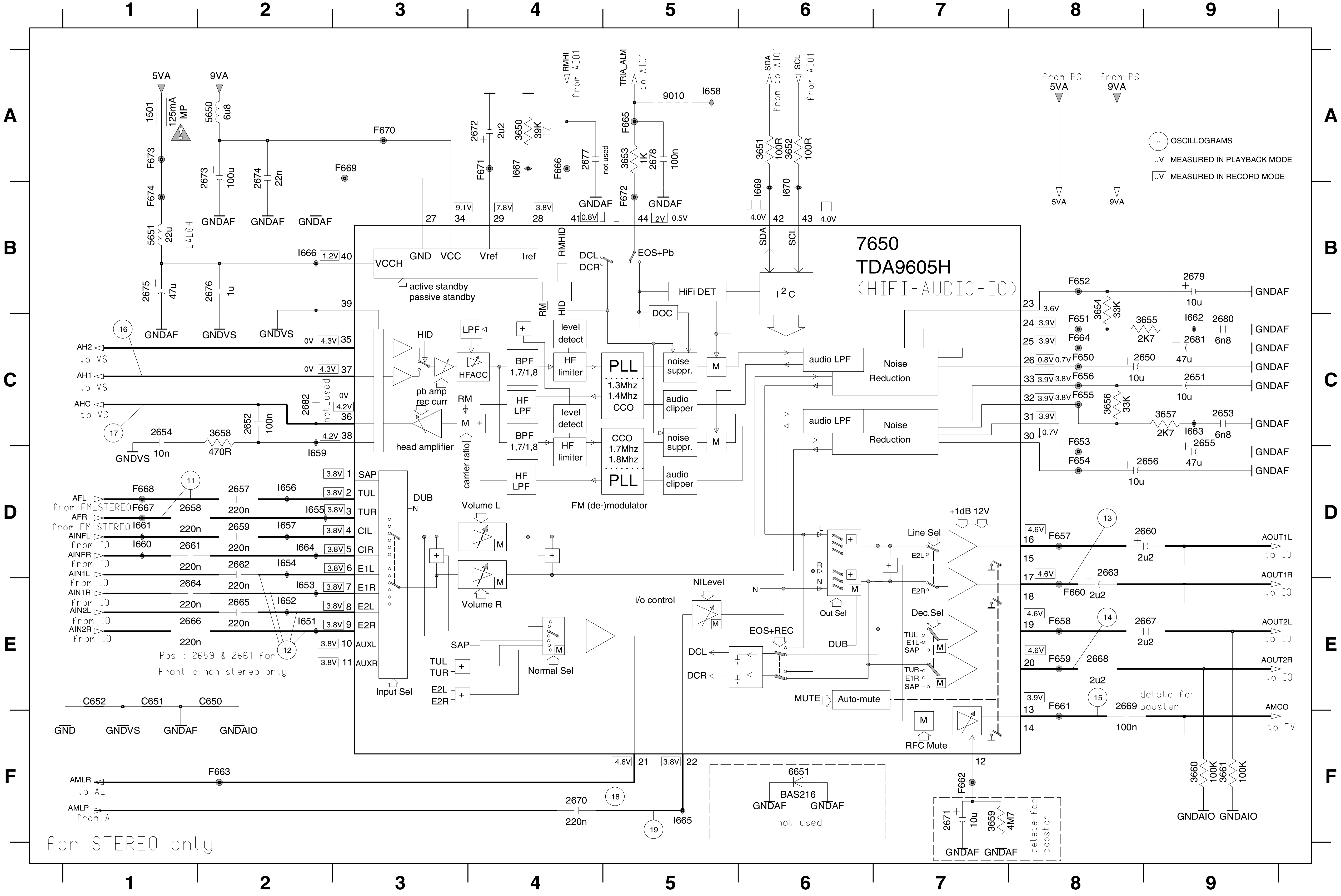
7.12 FM - Audio (AF)


7650
TDA9605H
(HIFI-AUDIO-IC)
OSCILLOGRAMS
..V MEASURED IN PLAYBACK MODE
..V MEASURED IN RECORD MODE
from PS 5VA
from PS 9VA
5VA
9VA
1501 125mA MP
5650 6u8
5651 22u
LAL04
2673 100u
2674 22n
2675 47u
2676 1u
F670
F669
F673
F674
GNDAF
GNDVS
GNDAIO
GND
VCCH
GND
VCC
Vref
Iref
active standby
passive standby
2672 2u2
3650 39K 1%
I667
F671
F666
2677 not used
RMHI from AIO1
TRIA_ALM to AIO1
9010
I658
F665
3653 1K
2678 100n
F672
SDA from to AIO1
SCL from AIO1
3651 100R
3652 100R
I669
I670
RMHID
RM
HID
DCL
DCR
EOS+Pb
HiFi DET
I²C
DOC
LPF
HFAGC
level detect
HF limiter
BPF 1,7/1,8
HF LPF
PLL
1.3Mhz 1.4Mhz CCO
CCO 1.7Mhz 1.8Mhz
noise suppr.
audio clipper
audio LPF
Noise Reduction
FM (de-)modulator
pb amp
rec curr
head amplifier
carrier ratio
AH2 to VS
AH1 to VS
AHC to VS
2682 not_used
2652 100n
2654 10n
3658 470R
I659
I666
AFL from FM_STEREO
AFR from FM_STEREO
AINFL from IO
AINFR from IO
AIN1L from IO
AIN1R from IO
AIN2L from IO
AIN2R from IO
F668
F667
I661
I660
2657 220n
2658 220n
2659 220n
2661 220n
2662 220n
2664 220n
2665 220n
2666 220n
I656
I655
I657
I664
I654
I653
I652
I651
Pos.: 2659 & 2661 for
Front cinch stereo only
SAP
TUL
TUR
CIL
CIR
E1L
E1R
E2L
E2R
AUXL
AUXR
DUB
N
Input Sel
Volume L
Volume R
Normal Sel
i/o control
NILevel
EOS+REC
DCL
DCR
Out Sel
Line Sel
Dec.Sel
+1dB 12V
Auto-mute
MUTE
RFC Mute
C652
C651
C650
F652
F651
F664
F650
F656
F655
F653
F654
2679 10u
3654 33K
3655 2K7
I662
2680 6n8
2681 47u
2650 10u
2651 10u
3656 33K
3657 2K7
I663
2653 6n8
2655 47u
2656 10u
F657
F660
F658
F659
F661
2660 2u2
2663 2u2
2667 2u2
2668 2u2
2669 100n
delete for booster
AOUT1L to IO
AOUT1R to IO
AOUT2L to IO
AOUT2R to IO
AMCO to FV
3660 100K
3661 100K
F662
2671 10u
3659 4M7
6651 BAS216
not used
AMLR to AL
AMLP from AL
F663
2670 220n
I665
for STEREO only

1501 A1	F672 B5
2650 C9	F673 A1
2651 C9	F674 B1
2652 C2	I651 E2
2653 C9	I652 E2
2654 C1	I653 E2
2655 D9	I654 D2
2656 D9	I655 D2
2657 D2	I656 D2
2658 D1	I657 D2
2659 D2	I658 A5
2660 D9	I659 D2
2661 D1	I660 D1
2662 D2	I661 D1
2663 D8	I662 C9
2664 E1	I663 C9
2665 E2	I664 D2
2666 E1	I665 F5
2667 E9	I666 B2
2668 E8	I667 A4
2669 E8	I669 B6
2670 F4	I670 B6
2671 F7	
2672 A4	
2673 A2	
2674 A2	
2675 B1	
2676 B2	
2677 A4	
2678 A5	
2679 B9	
2680 C9	
2681 C9	
2682 C2	
3650 A4	
3651 A6	
3652 A6	
3653 A5	
3654 B8	
3655 C9	
3656 C8	
3657 C9	
3658 C2	
3659 F7	
3660 F9	
3661 F9	
5650 A2	
5651 B1	
6651 F6	
7650 B3	
9010 A5	
C650 E2	
C651 E1	
C652 E1	
F650 C8	
F651 C8	
F652 B8	
F653 C8	
F654 D8	
F655 C8	
F656 C8	
F657 D8	
F658 E8	
F659 E8	
F660 D8	
F661 E8	
F662 F7	
F663 F2	
F664 C8	
F665 A5	
F666 A4	
F667 D1	
F668 D1	
F669 A3	
F670 A3	
F671 A4	

Interconnections:

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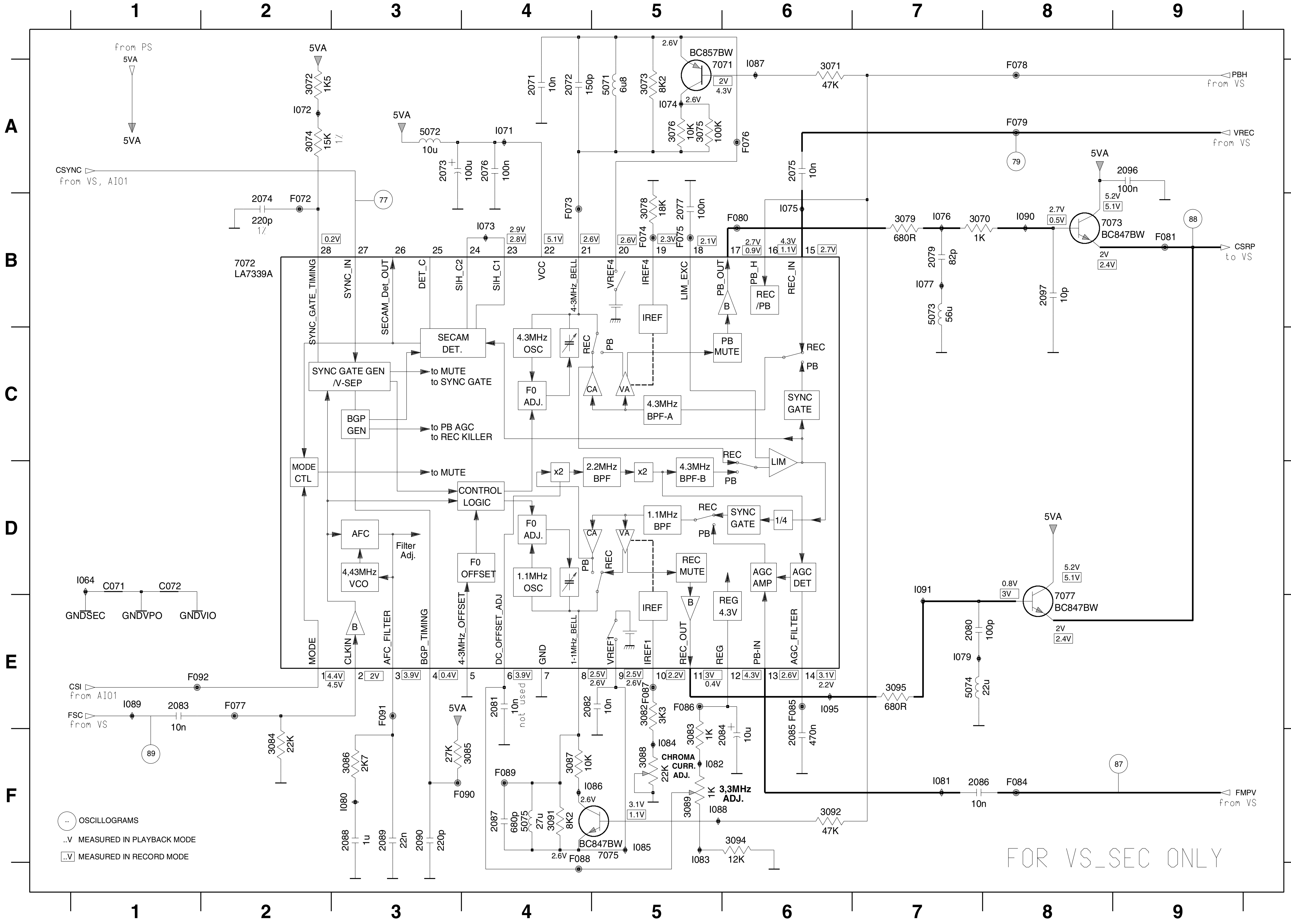
7.13 Video Signal Processing - SECAM (VS-SEC)


1 2 3 4 5 6 7 8 9
A B C D E F
from PS
5VA
CSYNC from VS, AI01
CSI from AI01
FSC from VS
PBH from VS
VREC from VS
CSRP to VS
FMPV from VS
7072 LA7339A
SYNC_GATE_TIMING
SYNC_IN
SECAM_Det_OUT
DET_C
SIH_C2
SIH_C1
VCC
4-3MHz_BELL
VREF4
IREF4
LIM_EXC
PB_OUT
PB_H
REC_IN
MODE
CLKIN
AFC_FILTER
BGP_TIMING
4-3MHz_OFFSET
DC_OFFSET_ADJ
GND
1-1MHz_BELL
VREF1
IREF1
REC_OUT
REG
PB-IN
AGC_FILTER
SECAM DET.
4.3MHz OSC
F0 ADJ.
IREF
PB MUTE
REC /PB
SYNC GATE GEN /V-SEP
to MUTE
to SYNC GATE
BGP GEN
to PB AGC
to REC KILLER
4.3MHz BPF-A
SYNC GATE
MODE CTL
to MUTE
CONTROL LOGIC
x2
2.2MHz BPF
4.3MHz BPF-B
LIM
AFC
Filter Adj.
4,43MHz VCO
F0 OFFSET
1.1MHz OSC
1.1MHz BPF
1/4
REC MUTE
REG 4.3V
AGC AMP
AGC DET
CA
VA
REC
PB
BC857BW 7071
BC847BW 7073
BC847BW 7077
BC847BW 7075
CHROMA CURR. ADJ.
3,3MHz ADJ.
not used
GNDSEC
GNDVPO
GNDVIO
I064 C071 C072
OSCILLOGRAMS
..V MEASURED IN PLAYBACK MODE
..V MEASURED IN RECORD MODE
FOR VS_SEC ONLY
77
79
87
88
89

2071 A4	I074 A5
2072 A4	I075 B6
2073 A3	I076 B7
2074 B2	I077 B7
2075 A6	I079 E7
2076 A4	I080 F3
2077 B5	I081 F7
2079 B7	I082 F5
2080 E7	I083 F5
2081 E4	I084 F5
2082 E4	I085 F5
2083 E1	I086 F5
2084 F6	I087 A6
2085 F6	I088 F5
2086 F7	I089 E1
2087 F4	I090 B8
2088 F3	I091 D7
2089 F3	I095 E6
2090 F3	
2096 A9	
2097 B8	
3070 B7	
3071 A6	
3072 A2	
3073 A5	
3074 A2	
3075 A5	
3076 A5	
3078 B5	
3079 B7	
3082 E5	
3083 F5	
3084 F2	
3085 F4	
3086 F3	
3087 F4	
3088 F5	
3089 F5	
3091 F4	
3092 F6	
3094 F6	
3095 E7	
5071 A5	
5072 A3	
5073 B7	
5074 E7	
5075 F4	
7071 A6	
7072 B2	
7073 B8	
7075 F5	
7077 E8	
C071 D1	
C072 D1	
F072 B2	
F073 B4	
F074 B5	
F075 B5	
F076 A6	
F077 E2	
F078 A8	
F079 A8	
F080 B6	
F081 B9	
F084 F8	
F085 E6	
F086 E5	
F087 E5	
F088 F4	
F089 F4	
F090 F4	
F091 E3	
F092 E1	
I064 D1	
I071 A4	
I072 A2	
I073 B4	

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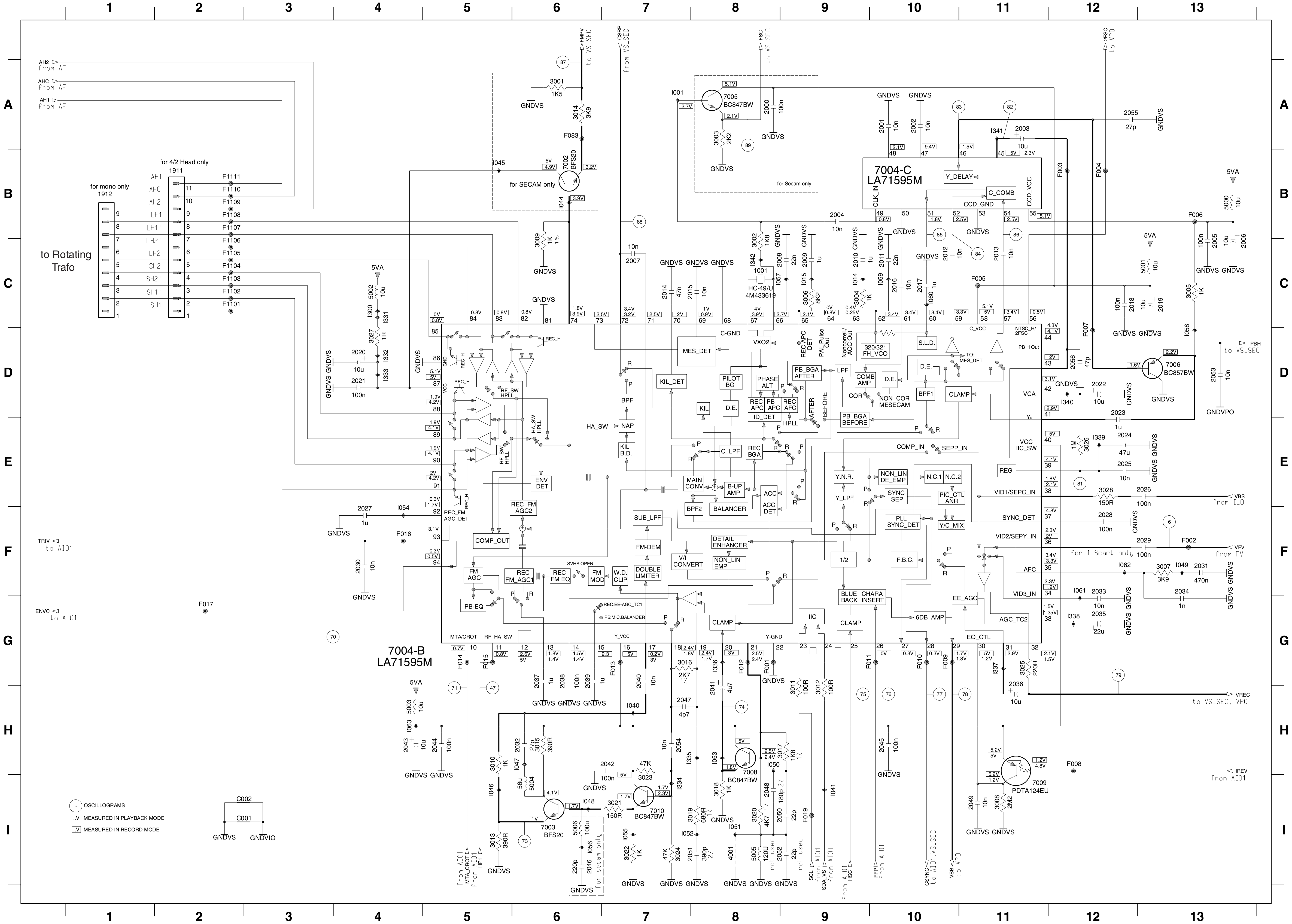
7.14 Video Signal Processing (VS)



7004-C
LA71595M
7004-B
LA71595M
7002 BFS20
7003 BFS20
7005 BC847BW
7006 BC857BW
7008 BC847BW
7009 PDTA124EU
7010 BC847BW
1001 HC-49/U 4M433619
for mono only 1912
for 4/2 Head only 1911
to Rotating Trafo
AH1 AHC AH2 LH1 LH1' LH2' LH2 SH2 SH2' SH1' SH1
AH2 from AF
AHC from AF
AH1 from AF
TRIV to AIO1
ENVC to AIO1
FMPV to VS_SEC
CSRP from VS_SEC
FSC to VS_SEC
2FSC to VPO
PBH to VS_SEC
VBS from I_O
VFV from FV
VREC to VS_SEC, VPO
IREV from AIO1
VSB to VPO
CSYNC to AIO1,VS_SEC
FFP from AIO1
HSC from AIO1
SDA_VS from AIO1
SCL from AIO1
MTA_CROT from AIO1
HP1 from AIO1
for SECAM only
for Secam only
for secam only
for 1 Scart only
not used
MES_DET
KIL_DET
KIL
BPF
NAP
KIL B.D.
PILOT BG
D.E.
VXO2
PHASE ALT
REC APC
PB APC
REC AFC
ID_DET
PB_BGA AFTER
PB_BGA BEFORE
LPF
COMB AMP
320/321 FH_VCO
S.L.D.
BPF1
CLAMP
C_LPF
REC BGA
MAIN CONV
B-UP AMP
ACC
ACC DET
BPF2
BALANCER
ENV DET
REC_FM AGC2
COMP_OUT
SUB_LPF
FM-DEM
DOUBLE LIMITER
W.D. CLIP
FM MOD
REC FM EQ
REC FM_AGC1
FM AGC
PB-EQ
V/I CONVERT
DETAIL ENHANCER
NON_LIN EMP
Y.N.R.
Y_LPF
NON_LIN DE_EMP
SYNC SEP
PLL SYNC_DET
N.C.1
N.C.2
PIC_CTL ANR
Y/C_MIX
1/2
F.B.C.
BLUE BACK
CHARA INSERT
IIC
6DB_AMP
EE_AGC
REG
Y_DELAY
C_COMB
CCD_VCC
CCD_GND
CLK_IN
VCA
VCC IIC_SW
VID1/SEPC_IN
SYNC_DET
VID2/SEPY_IN
AFC
VID3_IN
AGC_TC2
EQ_CTL
Y-GND
Y_VCC
C-GND
C_VCC
MTA/CROT
RF_HA_SW
REC_FM AGC_DET
COMP_IN
SEPP_IN
HA_SW
NON_COR MESECAM
COR
GNDVS
GNDVPO
GNDVIO
5VA
OSCILLOGRAMS
.V MEASURED IN PLAYBACK MODE
V MEASURED IN RECORD MODE

0050 D1	F009 G10
0051 E1	F010 G10
1001 C8	F011 G10
1911 B2	F012 G8
1912 B1	F013 G7
2000 A8	F014 G5
2001 A10	F015 G5
2002 A10	F016 F4
2003 A11	F017 G2
2004 B9	F019 I9
2005 C13	F083 A6
2006 C13	F1101 C2
2007 C7	F1102 C2
2008 C9	F1103 C2
2009 C9	F1104 C2
2010 C9	F1105 C2
2011 C10	F1106 C2
2012 C10	F1107 B2
2013 C11	F1108 B2
2014 C7	F1109 B2
2015 C8	F1110 B2
2016 C10	F1111 B2
2017 C10	I001 A7
2018 C12	I014 C9
2019 C13	I015 C9
2020 D4	I040 H7
2021 D4	I041 I9
2022 D12	I044 B6
2023 D12	I045 B5
2024 E12	I046 I5
2025 E12	I047 H6
2026 E13	I048 I6
2027 F4	I049 F13
2028 F12	I050 H8
2029 F13	I051 I8
2030 F4	I052 I7
2031 F13	I053 H8
2032 H6	I054 F4
2033 F12	I055 I7
2034 F13	I056 I6
2035 G12	I057 C8
2036 H11	I058 D13
2037 G6	I059 C10
2038 G6	I060 C10
2039 G6	I061 F12
2040 G7	I062 F12
2041 H8	I063 H4
2042 H7	I300 C4
2043 H4	I331 C4
2044 H5	I332 D4
2045 H10	I333 D4
2046 I6	I334 I7
2047 H7	I335 H7
2048 I8	I336 G8
2049 I11	I337 G11
2050 I9	I338 G12
2051 I8	I339 E12
2052 I9	I340 D12
2053 D13	I341 A11
2054 H7	I342 C8
2055 A12	
2056 D12	
3001 A6	
3002 C8	
3003 A8	
3004 C9	
3005 C13	
3006 C9	
3007 F13	
3008 I11	
3009 C6	
3010 H5	
3011 H9	
3012 H9	
3013 I5	
3014 A6	
3015 H6	
3016 G7	
3017 H9	
3018 I8	
3019 I8	
3020 I8	
3021 I7	
3022 I7	
3023 I7	
3024 I7	
3025 G11	
3026 E12	
3027 D4	
3028 E12	
4001 I8	
5000 B13	
5001 C13	
5002 C4	
5003 H4	
5004 I6	
5005 I8	
5006 I6	
7002 B6	
7003 I6	
7004-B G5	
7004-C B10	
7005 A8	
7006 D13	
7008 H8	
7009 I11	
7010 I7	
C001 I3	
C002 I3	
F001 G8	
F002 F13	
F003 B12	
F004 B12	
F005 C11	
F006 B13	
F007 D12	
F008 H12	

Interconnections:

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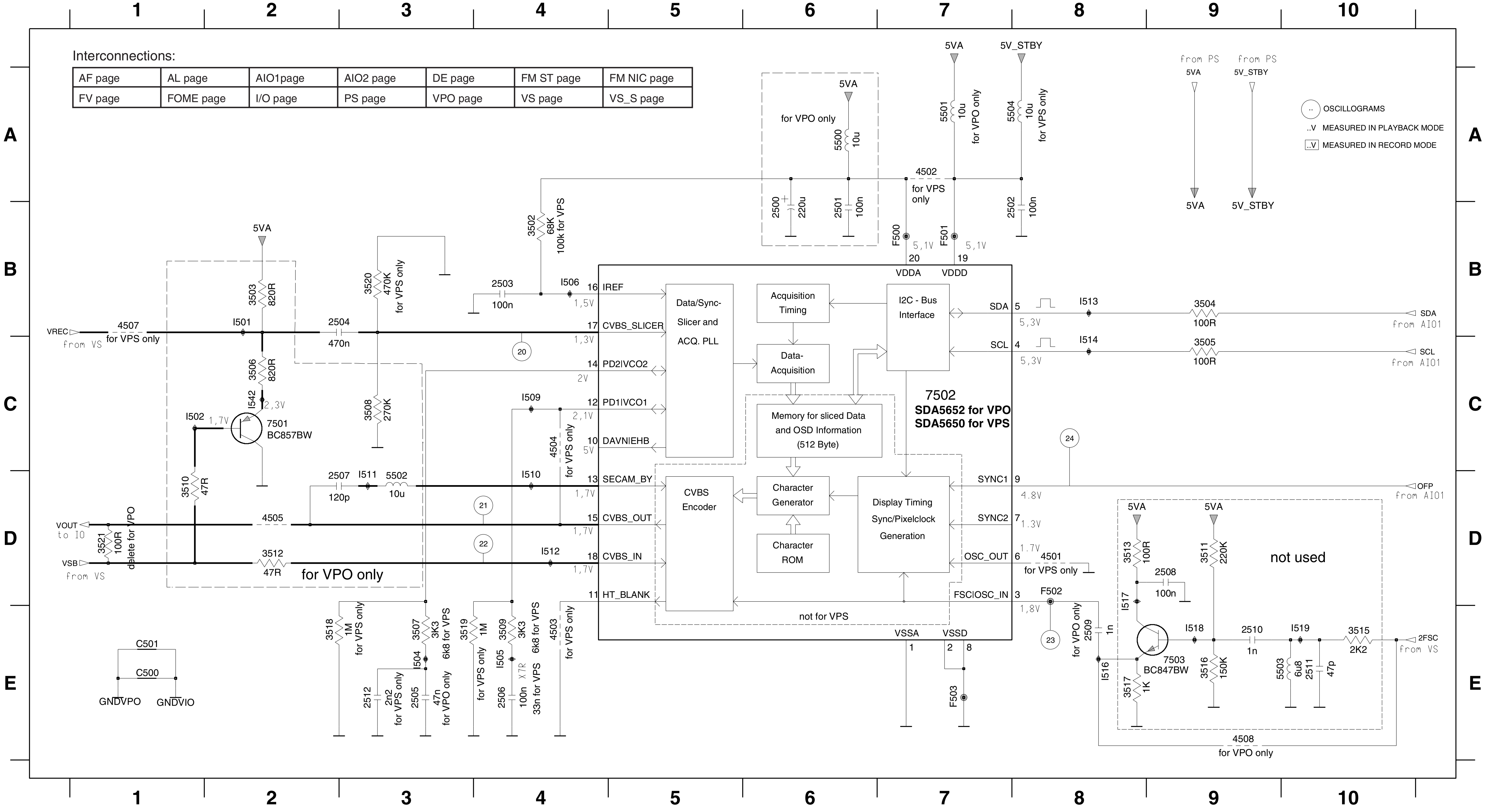
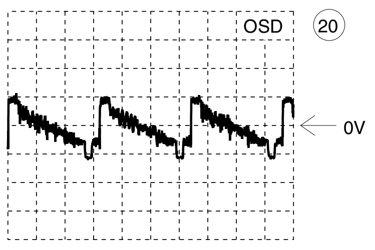
7.15 VPS/PDC & OSD Part (VPO)

2500 B6
2501 B6
2502 B8
2503 B4
2504 B2
2505 E3
2506 E4
2507 D2
2508 D9
2509 E8
2510 E9
2511 E10
2512 E3
3502 B4
3503 B2
3504 B9
3505 C9
3506 C2
3507 E3
3508 C3
3509 E4
3510 D1
3511 D9
3512 D2
3513 D8
3515 E10
3516 E9
3517 E8
3518 E2
3519 E3
3520 B3
3521 D1
4501 D8
4502 A7
4503 E4
4504 C4
4505 D2
4507 B1
4508 E9
5500 A6
5501 A7
5502 D3
5503 E10
5504 A8
7501 C2
7502 C7
7503 E9
C500 E1
C501 E1
F500 B7
F501 B7
F502 D8
F503 E7
I501 B2
I502 C1
I504 E3
I505 E4
I506 B4
I509 C4
I510 D4
I511 D3
I512 D4
I513 B8
I514 C8
I516 E8
I517 D8
I518 E9
I519 E10
I542 C2

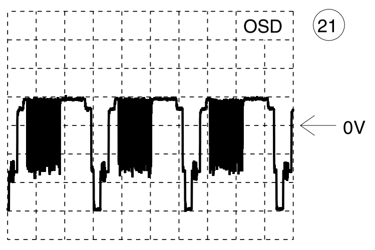
Interconnections:

AF page	AL page	AIO1page	AIO2 page	DE page	FM ST page	FM NIC page
FV page	FOME page	I/O page	PS page	VPO page	VS page	VS_S page

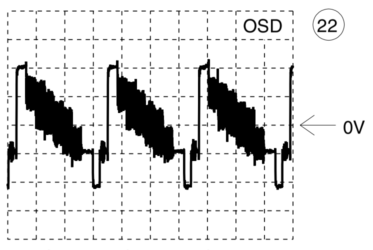

1
2
3
4
5
6
7
8
9
10
A
B
C
D
E
5VA
5V_STBY
from PS
5VA
5V_STBY
OSCILLOGRAMS
..V MEASURED IN PLAYBACK MODE
..V MEASURED IN RECORD MODE
5500
10u
for VPO only
2500
220u
2501
100n
5501
10u
for VPO only
5504
10u
for VPS only
4502
for VPS only
2502
100n
F500
F501
5,1V
5,1V
3502
68K
100k for VPS
2503
100n
I506
1,5V
3520
470K
for VPS only
3503
820R
3506
820R
I542
2,3V
7501
BC857BW
I502
1,7V
3510
47R
VREC
from VS
4507
for VPS only
I501
2504
470n
3508
270K
2507
120p
I511
5502
10u
I509
I510
4504
for VPS only
VOUT
to IO
3521
100R
delete for VPO
VSB
from VS
4505
3512
47R
for VPO only
I512
C501
C500
GNDVPO
GNDVIO
3518
1M
for VPS only
2512
2n2
for VPS only
3507
3K3
6k8 for VPS
I504
2505
47n
for VPO only
3519
1M
for VPS only
3509
3K3
6k8 for VPS
I505
X7R
2506
100n
33n for VPS
4503
for VPS only
16 IREF
17 CVBS_SLICER
14 PD2IVCO2
12 PD1IVCO1
10 DAVNIEHB
13 SECAM_BY
15 CVBS_OUT
18 CVBS_IN
11 HT_BLANK
1,3V
2V
2,1V
5V
1,7V
1,7V
1,7V
20
21
22
20 VDDA
19 VDDD
Data/Sync-Slicer and ACQ. PLL
Acquisition Timing
Data-Acquisition
I2C - Bus Interface
Memory for sliced Data and OSD Information (512 Byte)
CVBS Encoder
Character Generator
Character ROM
Display Timing Sync/Pixelclock Generation
not for VPS
7502
SDA5652 for VPO
SDA5650 for VPS
SDA 5
SCL 4
SYNC1 9
SYNC2 7
OSC_OUT 6
FSC|OSC_IN 3
VSSA 1
VSSD 2 8
5,3V
5,3V
4.8V
1.3V
1.7V
1,8V
F503
I513
I514
3504
100R
3505
100R
SDA
from AIO1
SCL
from AIO1
24
OFP
from AIO1
4501
for VPS only
F502
23
2509
1n
for VPO only
I516
I517
3513
100R
2508
100n
5VA
5VA
3511
220K
7503
BC847BW
3517
1K
I518
3516
150K
2510
1n
I519
5503
6u8
2511
47p
3515
2K2
2FSC
from VS
not used
4508
for VPO only



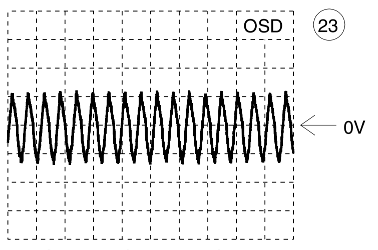
A: AC, 500mV/Div, 20us/Div
IC 7502 PIN17



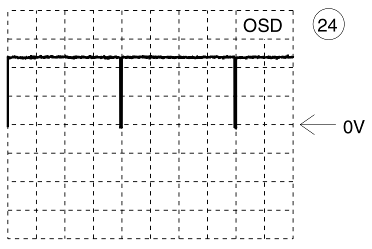
A: AC, 500mV/Div, 20us/Div
IC 7502 PIN15 VOUT



A: AC, 500mV/Div, 20us/Div
IC 7502 PIN18 VSB

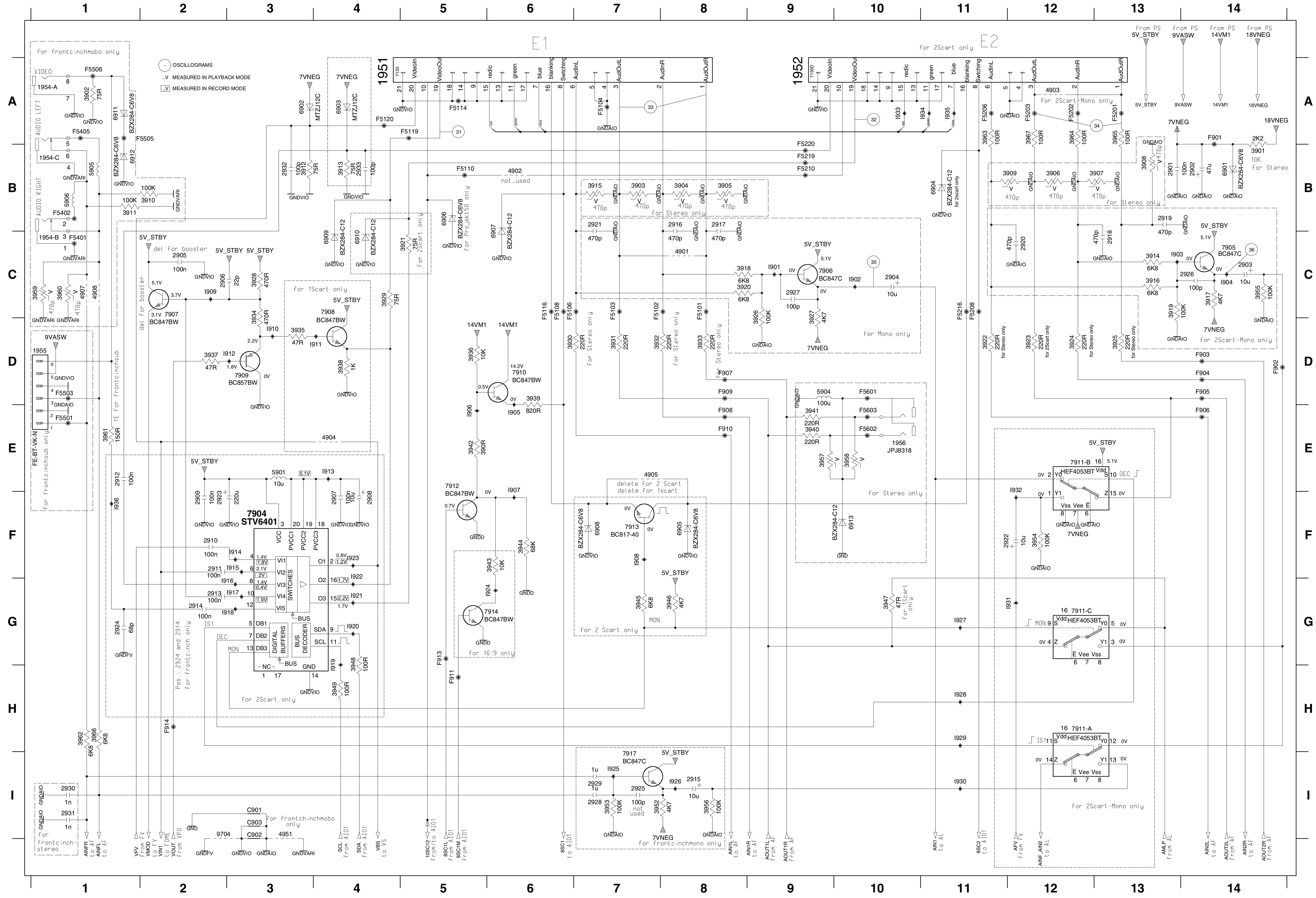


A: AC, 100mV/Div, 200ns/Div
IC 7502 PIN3 2FSC



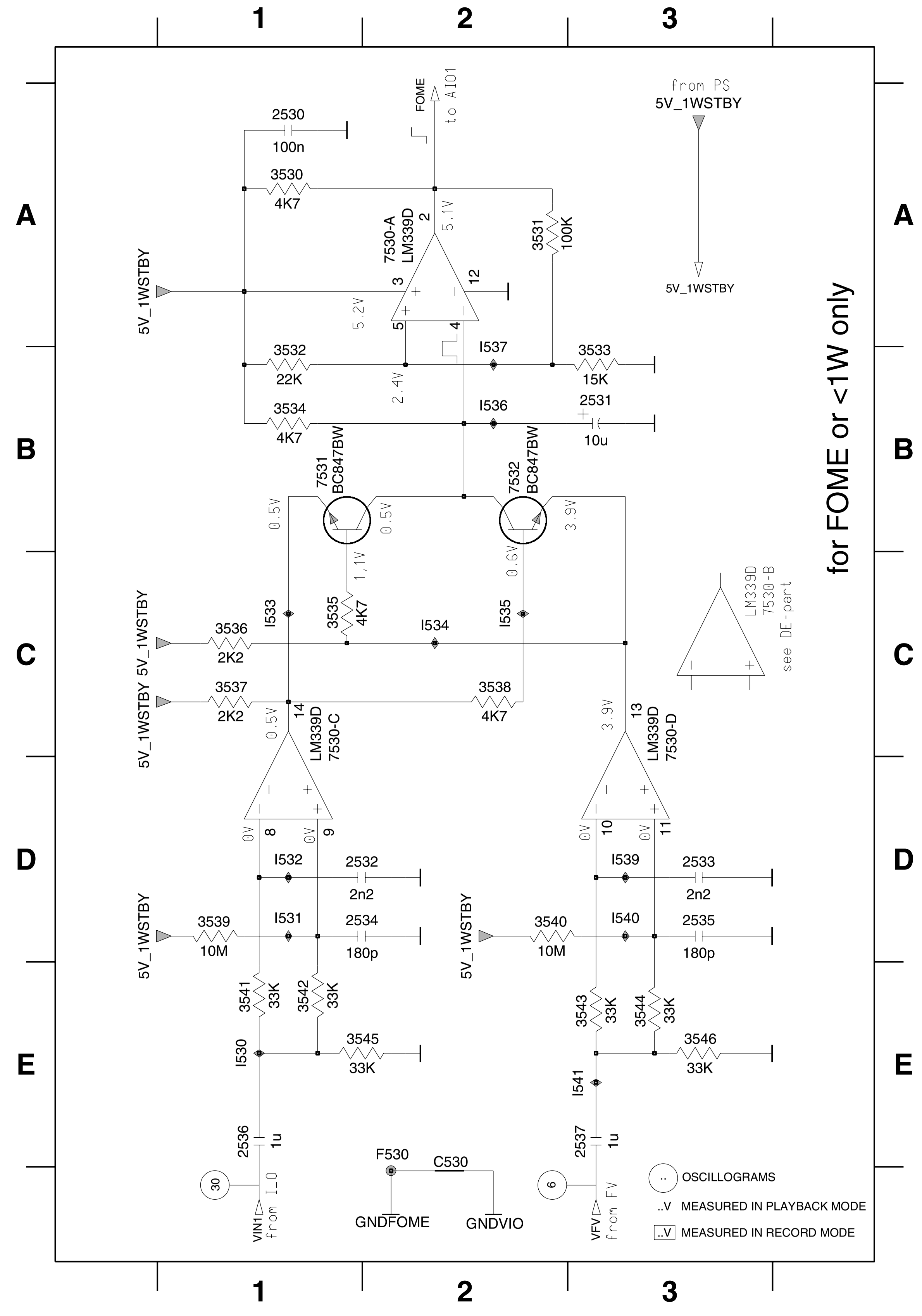
A: DC, 2 V/Div, 5ms/Div
IC 7502 PIN9 OFP

7.16 In/Out Part (IO)


E1
E2
1951
1952
1954-A
1954-B
1954-C
1955
1956 JPJ8318
FE-BT-VK-N
7904 STV6401
SWITCHES
DIGITAL BUFFERS
BUS DECODER
7905 BC847C
7906 BC847C
7907 BC847BW
7908 BC847BW
7909 BC857BW
7910 BC847BW
7912 BC847BW
7913 BC817-40
7914 BC847BW
7917 BC847C
7911-A HEF4053BT
7911-B HEF4053BT
7911-C HEF4053BT
OSCILLOGRAMS
..V MEASURED IN PLAYBACK MODE
V MEASURED IN RECORD MODE
for frontcinchmobo only
for frontcinchsub only
for 2Scart only
for Stereo only
for Mono only
for 1Scart only
for 2Scart-Mono only
for 16:9 only
for 2 Scart only
for frontcinchmono only
for frontcinch-stereo
del for booster
delete for 2 Scart
delete for 1scart
not_used
for Projekt50 only
Pos.: 2924 and 2914 for frontcinch only
from PS 5V_STBY
from PS 9VASW
from PS 14VM1
from PS 18VNEG
1 2 3 4 5 6 7 8 9 10 11 12 13 14
A B C D E F G H I

1951	A4
1952	A9
1954-A	A1
1954-B	C1
1954-C	B1
1955	D1
1956	E10
2901	B13
2902	B14
2903	C14
2904	C10
2905	C2
2906	C2
2907	F4
2908	F4
2909	F2
2910	F2
2911	F2
2912	E1
2913	G2
2914	G2
2915	I8
2916	B8
2917	B8
2918	C13
2919	B13
2920	C12
2921	B7
2922	F12
2923	F3
2924	G1
2925	I7
2926	C14
2927	C9
2928	I7
2929	I7
2930	I1
2931	I1
2932	B3
2933	B4
3901	B14
3902	A1
3903	B7
3904	B8
3905	B8
3906	B12
3907	B13
3908	B13
3909	B12
3910	B2
3911	B1
3912	B3
3913	B4
3914	C13
3915	B7
3916	C13
3917	C14
3918	C8
3919	C13
3920	C8
3921	C5
3922	D11
3923	D12
3924	D12
3925	D13
3926	C9
3927	C9
3928	C3
3929	C4
3930	D6
3931	D7
3932	D7
3933	D8
3934	C3
3935	D3
3936	D5
3937	D2
3938	D4
3939	D6
3940	E9
3941	E9
3942	E5
3943	F6
3944	F6
3945	G7
3946	G8
3947	G10
3948	G4
3949	H4
3952	I7
3953	I7
3954	F12
3955	C14
3956	I8
3957	E9
3958	E10
3959	C1
3960	C1
3961	E1
3962	H1
3963	A11
3964	A12
3965	A13
3966	H1
3967	A12
4901	C8
4902	B6
4903	A12
4904	E4
4905	E7
4907	C1
4908	C1
4951	I3
5901	E3
5904	D9
5905	B1
5906	B1
6901	B14
6902	A3
6903	A4
6904	B11
6905	F8
6906	B5
6907	B6
6908	F7
6909	C4
6910	C4
6911	A1
6912	B1
6913	F10
7904	F3
7905	C14
7906	C9
7907	C2
7908	C4
7909	D3
7910	D6
7911-A	H12
7911-B	E12
7911-C	G12
7912	E5
7913	F7
7914	G5
7917	I7
9704	I2
C901	I3
C902	I3
C903	I3
F5101	C8
F5102	C7
F5103	C7
F5104	A7
F5106	C6
F5108	C6
F5110	B5
F5114	A5
F5116	C6
F5119	A5
F5120	A4
F5201	A13
F5202	A12
F5203	A12
F5206	A11
F5208	C11
F5210	B9
F5216	C11
F5219	B9
F5220	B9
F5401	C1
F5402	B1
F5405	A1
F5501	E1
F5503	D1
F5505	A2
F5506	A1
F5601	D10
F5602	E10
F5603	E10
F901	A14
F902	D14
F903	D14
F904	D14
F905	D14
F906	E14
F907	D8
F908	E8
F909	D8
F910	E8
F911	H5
F913	G5
F914	H2
I901	C9
I902	C10
I903	C13
I904	C14
I905	E6
I906	E5
I907	E6
I908	F7
I909	C2
I910	D3
I911	D4
I912	D3
I913	E4
I914	F3
I915	F3
I916	F3
I917	G3
I918	G3
I919	G4
I920	G4
I921	G4
I922	F4
I923	F4
I924	G6
I925	I7
I926	I8
I927	G11
I928	H11
I929	H11
I930	I11
I931	G12
I932	E12
I933	A10
I934	A11
I935	A11
I936	F1

7.17 FOLLOW ME Part (FOME)


1
2
3
A
B
C
D
E
from PS
5V_1WSTBY
5V_1WSTBY
FOME
to AIO1
2530
100n
3530
4K7
7530-A
LM339D
5.1V
3531
100K
5.2V
2.4V
12
I537
3532
22K
3533
15K
3534
4K7
I536
2531
10u
7531
BC847BW
7532
BC847BW
0.5V
0.5V
1,1V
0.6V
3.9V
I533
3535
4K7
I534
I535
3536
2K2
3537
2K2
3538
4K7
LM339D
7530-B
see DE-part
0.5V
14
LM339D
7530-C
3.9V
13
LM339D
7530-D
for FOME or <1W only
0V
8
0V
9
0V
10
0V
11
I532
2532
2n2
I539
2533
2n2
3539
10M
I531
2534
180p
3540
10M
I540
2535
180p
3541
33K
3542
33K
3543
33K
3544
33K
I530
3545
33K
I541
3546
33K
2536
1u
2537
1u
30
VIN1
from I_O
F530
C530
GNDFOME
GNDVIO
6
VFV
from FV
OSCILLOGRAMS
..V MEASURED IN PLAYBACK MODE
..V MEASURED IN RECORD MODE

2530	A1
2531	B3
2532	D1
2533	D3
2534	D1
2535	D3
2536	E1
2537	E3
3530	A1
3531	A2
3532	B1
3533	B3
3534	B1
3535	C1
3536	C1
3537	C1
3538	C2
3539	D1
3540	D2
3541	E1
3542	E1
3543	E3
3544	E3
3545	E2
3546	E3
7530-A	A2
7530-C	D1
7530-D	D3
7531	B1
7532	B2
C530	E2
F530	E2
I530	E1
I531	D1
I532	D1
I533	C1
I534	C2
I535	C2
I536	B2
I537	A2
I539	D3
I540	D3
I541	E3

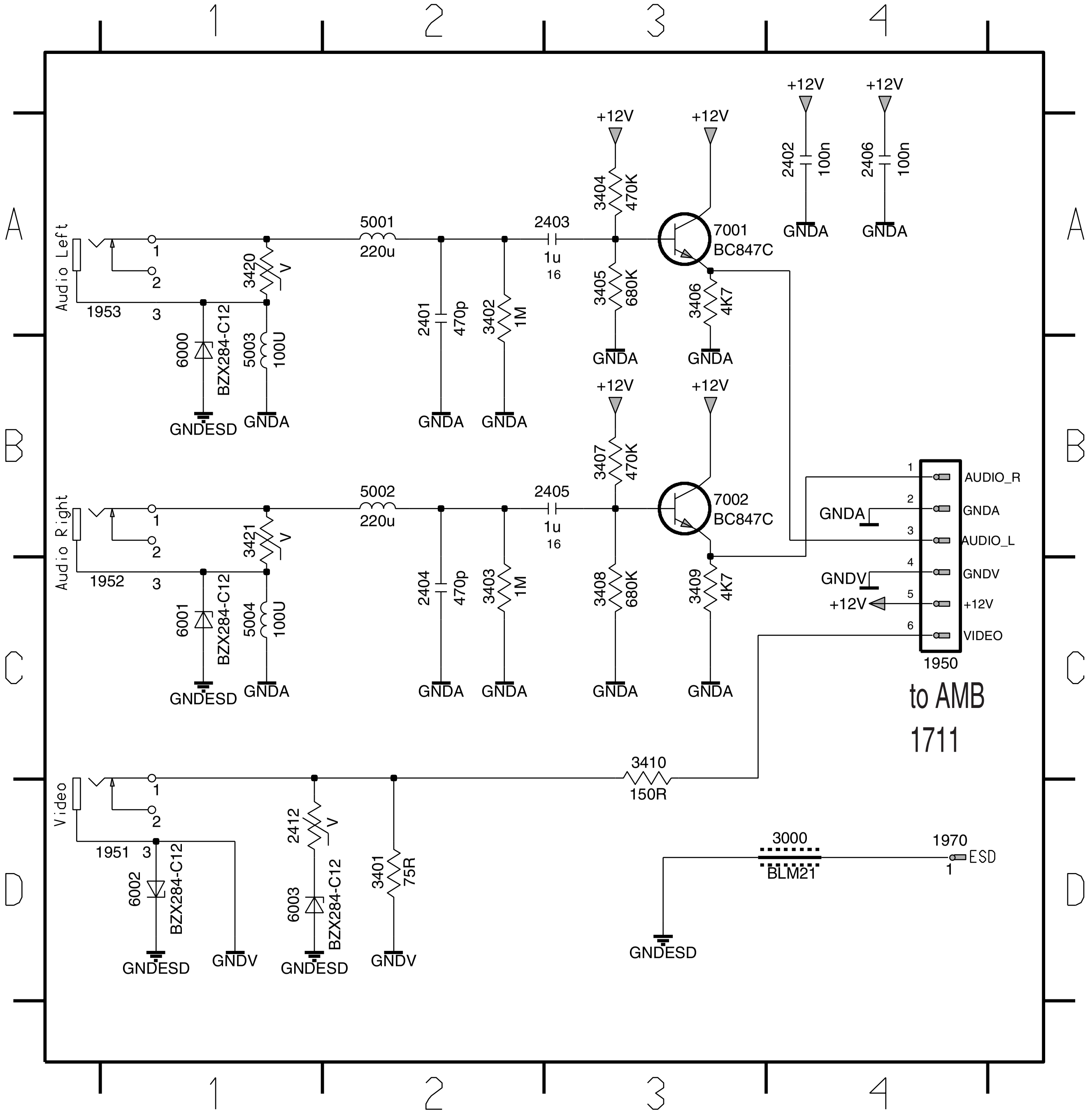
Interconnections:

AF page 65	AL page 64	AIO1page 58	AIO2 page 57	DE page 59	FM ST page 62	FM NIC page 63
FV page 61	FOME page 70	I/O page 69	PS page 56	VPO page 68	VS page 67	VS_S page 66

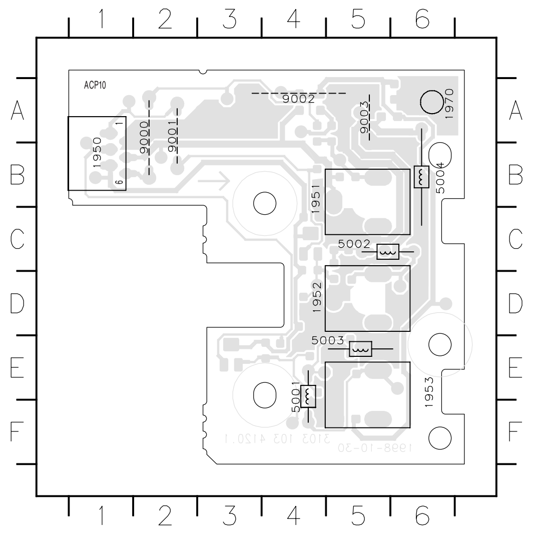
Engineer's remarks:

7.18 Socket Board (ACP1x)

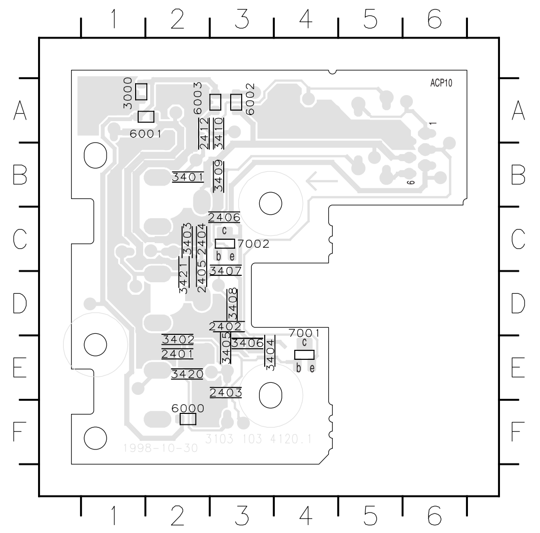
1950	C4	2402	A4	3000	D4	3406	A3	3421	B1	6001	C1
1951	D1	2403	A3	3401	D2	3407	B3	5001	A2	6002	D1
1952	C1	2404	C2	3402	A2	3408	C3	5002	B2	G003	D1
1953	A1	2405	B3	3403	C2	3409	C3	5003	B1	7001	A3
1970	D4	2406	A4	3404	A3	3410	C3	5004	C1	7002	B3
2401	A2	2412	D1	3405	A3	3420	A1	G000	B1		


1
2
3
4
A
B
C
D
Audio Left
Audio Right
Video
1953
1952
1951
3420
3421
2412
6000
6001
6002
6003
BZX284-C12
5003
5004
100U
5001
5002
220u
2401
2404
470p
3402
3403
1M
2403
2405
1u
16
3404
3407
470K
3405
3408
680K
3406
3409
4K7
7001
7002
BC847C
2402
2406
100n
+12V
GNDA
GNDESD
GNDV
3401
75R
3410
150R
3000
BLM21
1970
ESD
1950
AUDIO_R
GNDA
AUDIO_L
GNDV
+12V
VIDEO
to AMB
1711

7.19 Socket Boards (ACP10)

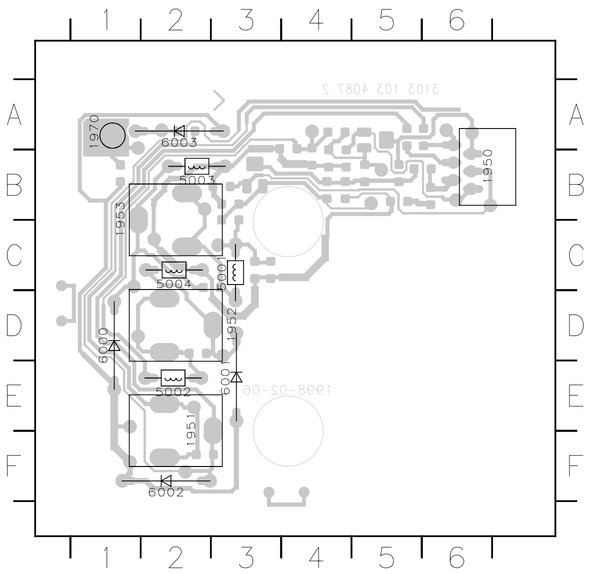

ACP10
1950
1951
1952
1953
1970
5001
5002
5003
5004
9000
9001
9002
9003

1950	B1
1951	B4
1952	D4
1953	E6
1970	A6
5001	E4
5002	C5
5003	E5
5004	B6
9000	A2
9001	A2
9002	A4
9003	A5

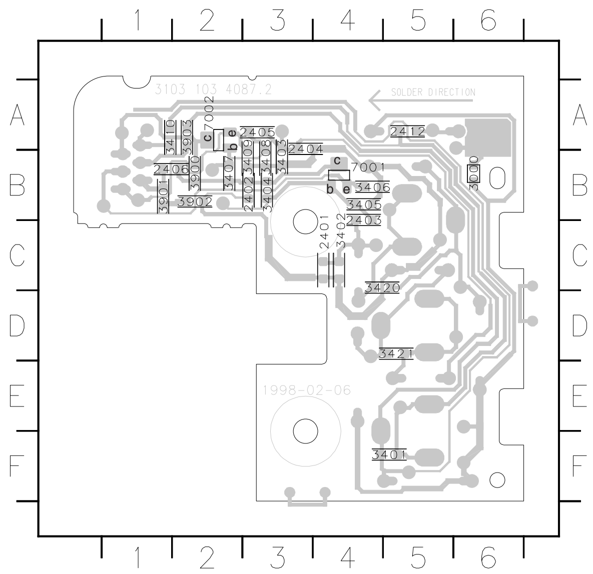

ACP10
3000
6001
6003
6002
7001
7002
3410
3401

2401	E2
2402	D3
2403	E3
2404	C2
2405	D2
2406	C3
2412	A2
3000	A1
3401	B2
3402	E2
3403	C2
3404	E3
3405	E3
3406	E3
3407	C3
3408	D3
3409	B3
3410	A3
3420	E2
3421	D2
6000	F2
6001	A2
6002	A3
6003	A2
7001	D4
7002	C3

7.20 Socket Boards (ACP1)

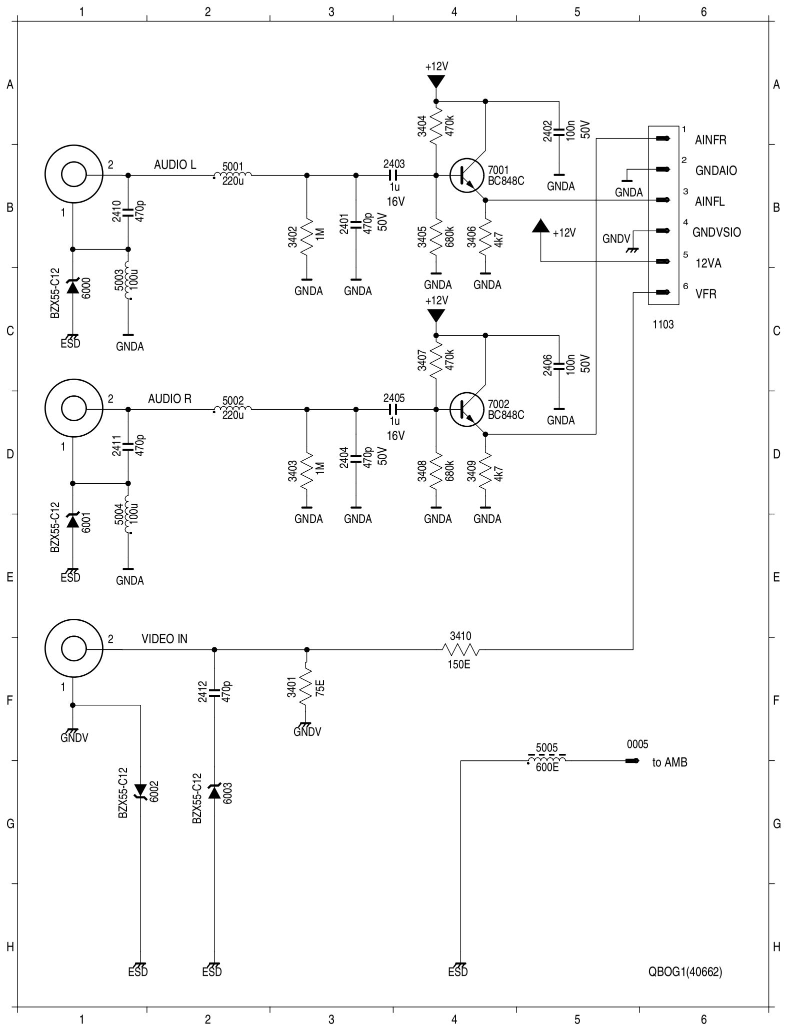

1970
1950
1951
1952
1953
5001
5002
5004
6002
6003

1950	B6
1951	E2
1952	D3
1953	B1
1970	A1
5001	C3
5002	E2
5003	B2
5004	C2
6000	D1
6001	E3
6002	F2
6003	A2


1998-02-06
7001
7002
2412
3420
3421
3401
3405
3406
2401
3402

2401	C4
2402	B3
2403	B4
2404	A3
2405	A3
2406	B1
2412	A5
3000	B6
3401	F5
3402	C4
3403	B3
3404	B3
3405	B4
3406	B4
3407	B2
3408	B3
3409	B3
3410	A1
3420	C4
3421	D5
3900	B2
3901	B1
3902	B2
3903	A2
7001	B4
7002	A2

7.21 Socket Board (QBOE1, QBOG1)

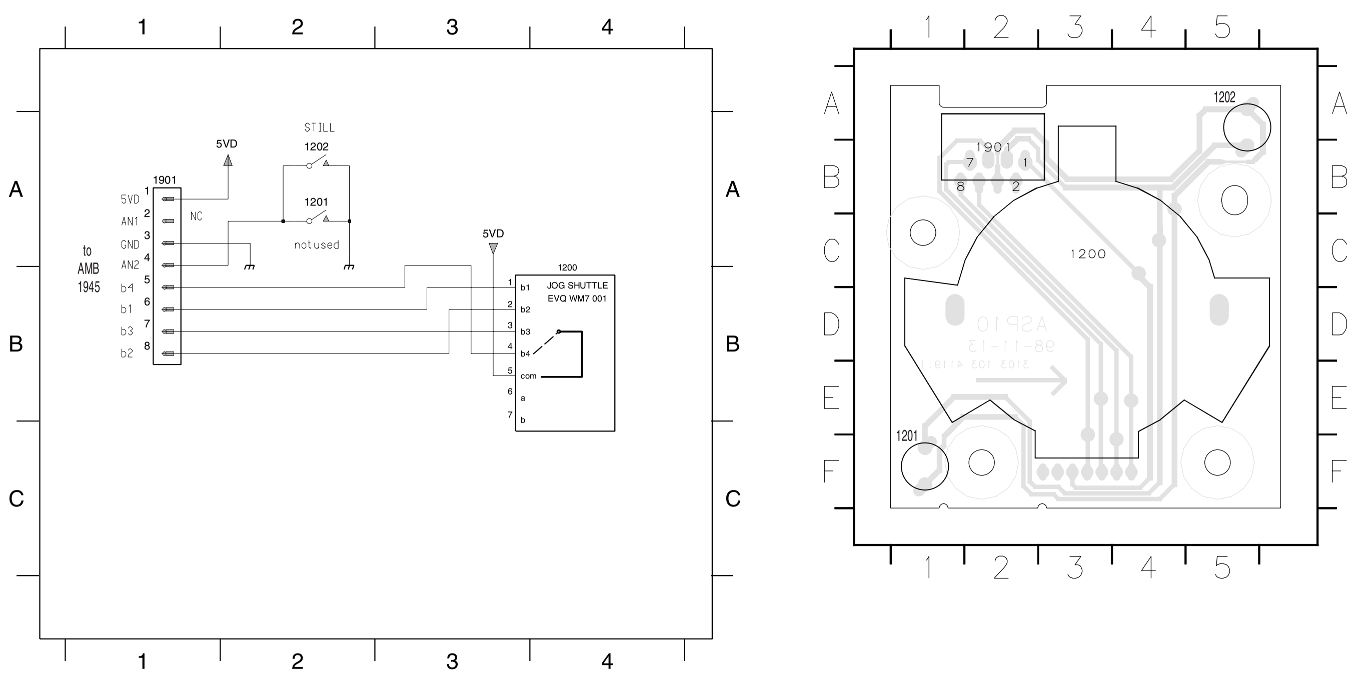

AUDIO L
AUDIO R
VIDEO IN
5001 220u
5002 220u
2403 1u 16V
2405 1u 16V
2401 470p 50V
2404 470p 50V
3402 1M
3403 1M
3404 470k
3405 680k
3406 4k7
3407 470k
3408 680k
3409 4k7
7001 BC848C
7002 BC848C
2402 100n 50V
2406 100n 50V
2410 470p
2411 470p
5003 100u
5004 100u
6000 BZX55-C12
6001 BZX55-C12
6002 BZX55-C12
6003 BZX55-C12
2412 470p
3401 75E
3410 150E
5005 600E
0005 to AMB
+12V
GNDA
GNDV
ESD
1103
AINFR
GNDAIO
AINFL
GNDVSIO
12VA
VFR
QBOG1(40662)

0005	F 5
1103	C 6
2401	B 3
2402	A 5
2403	B 4
2404	D 3
2405	D 4
2406	C 5
2410	B 1
2411	D 1
2412	F 2
3401	F 3
3402	B 3
3403	D 3
3404	A 4
3405	B 4
3406	B 4
3407	C 4
3408	D 4
3409	D 4
3410	F 4
5001	B 2
5002	D 2
5003	C 1
5004	D 1
5005	F 5
6000	C 1
6001	E 1
6002	G 2
6003	G 2
7001	B 4
7002	D 4

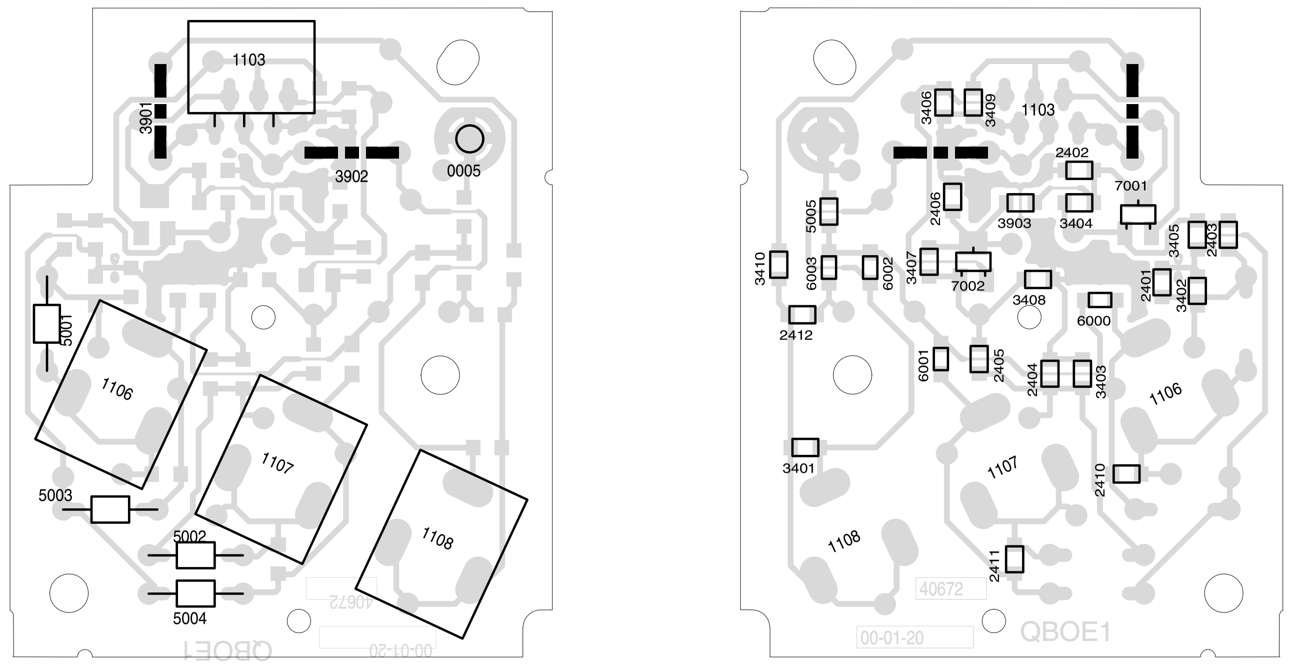
7.22 Shuttle board (ASP10)

1200 B4 1201 A2 1202 A2 1901 A1

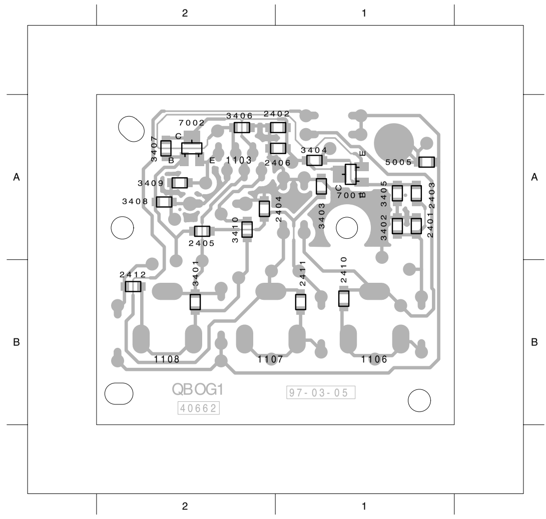
1200 C3 1201 F1 1202 A5 1901 B2


1901
5VD
AN1
GND
AN2
b4
b1
b3
b2
NC
to AMB 1945
5VD
STILL
1202
1201
not used
1200
JOG SHUTTLE
EVQ WM7 001
b1
b2
b3
b4
com
a
b
ASP10

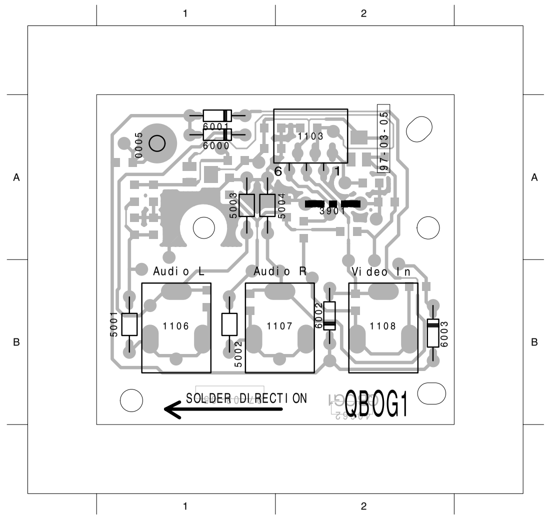
7.23 Socket Board (QBOE1)


1103
3901
3902
0005
5001
1106
1107
1108
5003
5002
5004
QBOE1
40672
00-01-20
3406
3409
2402
7001
3903
3404
2406
5005
3410
6003
6002
3407
7002
3408
6000
2401
3402
3405
2403
2412
6001
2405
2404
3403
3401
2410
2411

7.24 Socket Board (QBOG1)


QBOG1
40662
97-03-05
1108
1107
1106

2401	A 1
2402	A 1
2403	A 1
2404	A 2
2405	A 2
2406	A 1
2410	B 1
2411	B 1
2412	B 2
3401	B 2
3402	A 1
3403	A 1
3404	A 1
3405	A 1
3406	A 2
3407	A 2
3408	A 2
3409	A 2
3410	A 2
5005	A 1
7001	A 1
7002	A 2


Audio L
Audio R
Video In
1106
1107
1108
SOLDER DIRECTION
QBOG1
97-03-05

0005	A 1
1103	A 2
1106	B 1
1107	B 1
1108	B 2
3901	A 2
5001	B 1
5002	B 1
5003	A 1
5004	A 1
6000	A 1
6001	A 1
6002	B 2
6003	B 2

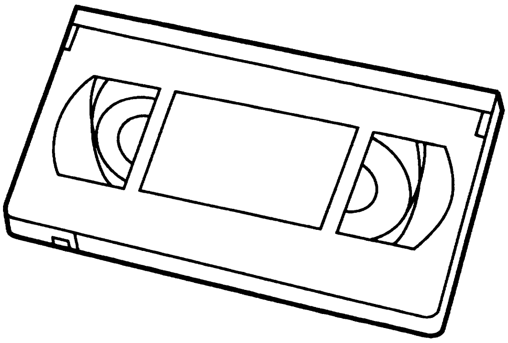
8. Electrical alignments

8.1 Measuring instruments

The following instruments are required to carry out the electrical setting work:

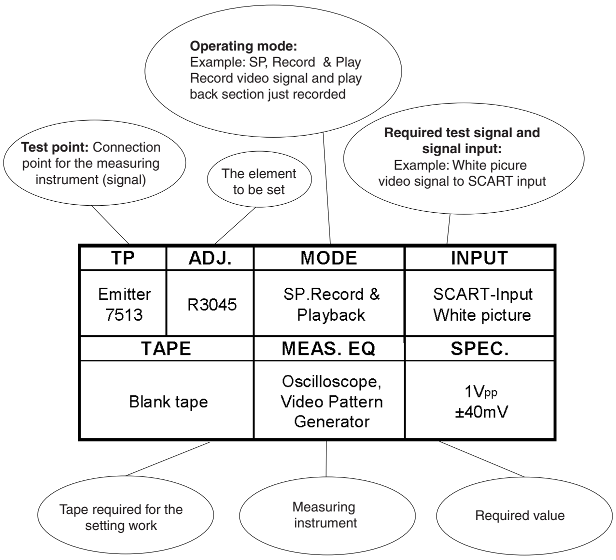
1. Dual trace oscilloscope
   Voltage range : 0.001 ~ 50V/Div.
   Frequency range : DC ~ 50 MHz
   Probe : 10:1; 1:1
2. Digital Multimeter
3. Frequency meter
4. Sine-wave generator : 0 ~ 50MHz
5. Test pattern generator
6. Plastic adjustment tool
7. Isolating transformer (regulating transformer)
8. VHS test cassette 4822 397 30103
   SPC test cassette 4822 397 30268

VHS test cassette



Counter Reading Start	0	0040 ±8	0310 ±12
Video	Blank	B&W Pattern	Color Bars
Audio	Blank	6kHz (mono)	40Hz, 3kHz, 15kHz (Mono & Stereo)

8.2 Setting instructions


Operating mode:
Example: SP, Record & Play
Record video signal and play back section just recorded
Test point: Connection point for the measuring instrument (signal)
The element to be set
Required test signal and signal input:
Example: White picure video signal to SCART input
Tape required for the setting work
Measuring instrument
Required value

TP	ADJ.	MODE	INPUT
Emitter 7513	R3045	SP.Record & Playback	SCART-Input White picture
TAPE		MEAS. EQ	SPEC.
Blank tape		Oscilloscope, Video Pattern Generator	1V_{pp} ±40mV

8.3 Video signal processing (VS-SEC)

Service tasks after replacement of ICs 7004, 7072:

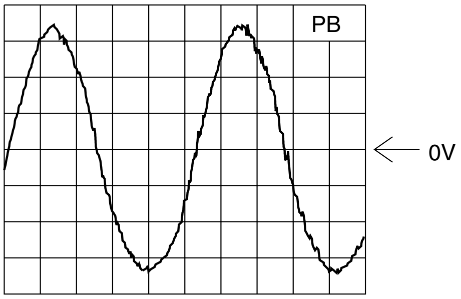
Before commencing adjustment:
Call the service test program and enter Step 10 (Dummy mode). Remove the drive from the motherboard.

8.3.1 3.3 MHz adjustment [3089] (for SECAM)

Purpose:
To adjust the mixing oscillator

Consequences of incorrect settings:
Cross patterns in coloured areas, coloured noise.

TP	ADJ.	MODE	INPUT
IC7072 pin 17	R3089	Dummy mode step 10 playback	1.2 MHz sinus 100mVpp, wire 9021 (FMPV)
TAPE		MEAS. EQ.	SPEC.
		Oscilloscope Video pattern generator Sinus generator	adjust to optimum sinus



A: AC, 50mV/Div, 50ns/Div
IC 7072 Pin 17

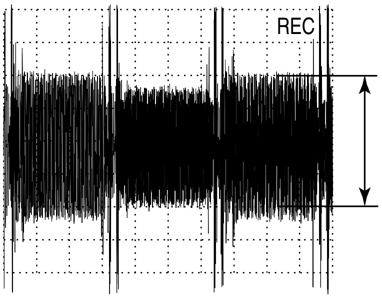
8.3.2 SECAM chrominance record current adjustment [3088]:

Purpose:
To set the optimum record SECAM chroma level.

Symptom, if incorrectly set:
If the record level is too high, beats may appear on the picture. If the level is too low, the colour may be degraded.

TP	ADJ.	MODE	INPUT
CSRP pos.9034	R3088	Dummy mode Record Preset E2	(VIDEO IN E2) Red Picture SECAM 75% Saturation
TAPE		MEAS. EQ.	SPEC.
Blank Tape		Oscilloscope Video Pattern Generator	**A**=200 ± 15 mV_{pp},

Notes:
With varying frame amplitudes, the setting is made for the greatest amplitude.



A: AC, 50mV/Div, 20us/Div

8.4 Front End (FV)

Service tasks after replacement of IC 7705, coil L5702 and TUMOD:

8.4.1 AFC Adjustment:

Purpose:
Correct adjustment of demodulator AFC - circuit

Symptom, if incorrectly set:
Bad or disturbed TV channel reception.

PAL - AFC adjustment [5702]:

TP	ADJ.	MODE	INPUT
IC 7705 Pin 17 (AFC TP9719)	L5702	E to E	38,9MHz 500mV$_{pp}$ at Tuner 1701 Pin 17 (TP9713,ZF-out)
TAPE		MEAS. EQ.	SPEC.
		DC Voltmeter Frequ. Generator	2,5V ±0,2V

SECAM band 1 - AFC adjustment [3730]: (SECAM L / L' only)

Before commencing adjustment:

- Switch to a band 1 SECAM L' preset.
- Is the system switch, in the menu 'MANUAL SEARCHING', not possible, press the right cursor key of the remote in the 'CHANNEL NUMBER' line for a short moment.
- A fine-tuning will be done and the system will switch to the 'AUTO' function.

TP	ADJ.	MODE	INPUT
IC 7705 pin 17 (AFC TP9719)	R3730	E to E, SECAM L' tuned on this preset	33,9MHz 500mV$_{pp}$ at Tuner 1701, pin 17 (TP9713, ZF-out)
TAPE		MEAS. EQ.	SPEC.
		DC Voltmeter Sinus Generator	2,5V ±0,2V

8.4.2 HF - AGC adjustment [3707]:

Service tasks after replacement of ICs 7705, or TUMOD:

Purpose:
Set amplifier control.

Symptom, if incorrectly set:
Picture jitter if input level is too low and picture distortion if input level is too high.

TP	ADJ.	MODE	INPUT
Tuner 1701 Pin 17 (TP9713, ZF-out)	R3707	Set tuned to channel 27	4,5mV(74dBµV) on aerial input PAL white picture, audio IF on, no modulation
TAPE		MEAS. EQ.	SPEC.
		Oscilloscope Video Pattern Generator	550mV$_{pp}$ +/-50mV (use a 10:1 probe)

8.4.3 Attenuating the 40.4 MHz [5704]: (SECAM only)

Service tasks after replacement of coil 5704:

Purpose:
To attenuate the band I carrier rests.

Symptom, if incorrectly set:
Bad picture quality when the filter attenuates the picture carrier (38.9MHz).

TP	ADJ.	MODE	INPUT
OFW 1704 Pin 1	L5704	E to E	40.4 MHz, 300mV$_{rms}$ at Tuner 1701 Pin 17 (TP9713,ZF-out)
TAPE		MEAS. EQ.	SPEC.
		Oscilloscope, Sinus Generator, Counter	adjust minimum amplitude

If the adjustment is correct the signal at pin 1 of SFW [1704] must be smaller than the input signal amplitude by at least 5 dB.

8.5 Deck electronics (DE)

Service tasks after replacement of IC 7463:

8.5.1 Motor frequency - adjustment [2492]:

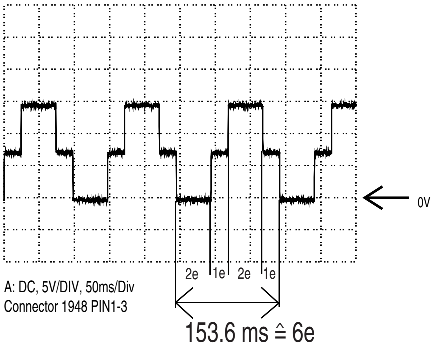
Purpose:
To adjust the working frequency of the head motor driver.

Result of an incorrect adjustment:
Head motor doesn't start correctly.

Before commencing adjustment:

- bring VCR in to EJECT state
- disconnect set from main power source
- remove cable 8004 from connector 1948
- connect test point DRUM [9417] with 5VS1 [9869] (wires on component side)
- reconnect to main power source

TP	ADJ.	MODE	INPUT
Connector 1948 Pin 1	C2492	EJECT	
TAPE		MEAS. EQ.	SPEC.
		Oscilloscope, Counter	153,6 ms ±1,5ms see Diagram



8.6 Servo System (AIO1)

Service tasks after replacement of the head drum or EEPROM.

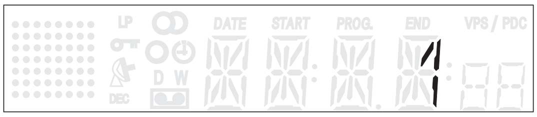
8.6.1 Setting the gap position (GAP):

Purpose:
To determine the correct head switching point during playback.
Symptom if incorrectly set:
Head switching fault and/or vertical picture flickers.

- Enter the service test program and, whilst step display is flashing, enter the step number 51, using the numerical keys.
- Insert a test cassette (e.g. 4822 397 30103) with the standard video signal in the VCR.
- By pressing the SELECT key whilst step 51 is flashing, the automatic adjustment is triggered and stored in the EEPROM .

TP	ADJ.	MODE	INPUT
		Stop Service Mode	
TAPE		MEAS. EQ.	SPEC.
VHS Alignment Tape			Call up Step 51 of Service Mode

After a correct adjustment, the display shows 1;0 when incorrect. To leave the step, press SELECT.



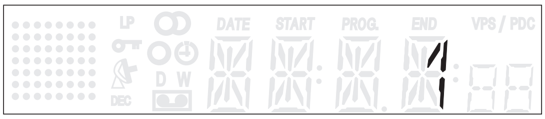
Causes of incorrect adjustment :
Incorrect standard video signal.
Scanner fault.
Microprocessor fault.

8.6.2 ”Studio Picture control” adjustment (SPC):

Purpose:
Adjustment of the reference level for the SPC.
Symptom if incorrectly set:
The picture is played back at a lower resolution than would be possible.

TP	ADJ.	MODE	INPUT
		Stop Service Mode	RF or A1- input, black picture without BURST
TAPE		MEAS. EQ.	SPEC.
SPC Alignment Tape			Call up Step 52 of Service Mode

- Video signal via Scart or aerial
- Enter the service test program and, whilst the step is flashing, input the step number 52, using the numerical keys.
- Insert SPC Alignment Tape 4822 397 30268.
- By pressing the SELECT key whilst step 52 is flashing, the recorder makes a recording in SP mode (approx. 10 sec.) and in LP mode (approx. 10 sec.), rewinds and carries out a playback with automatic adjustment.
- After a correct adjustment the display shows 1, and 0 for incorrect adjustments.



To leave the step press SELECT.

8.7 Audio linear - (AL)

Service tasks after replacement of coil L5600, IC7004 or the audio heads:

8.7.1 Adjusting the erasing frequency [5600]:

Purpose:
To set the correct recording erasing frequency.
Symptom, if incorrectly set:
Erasing frequency or its harmonics cause audio faults.

TP	ADJ.	MODE	INPUT
connector 1965 pin 5	L5600	Record E1	PAL white picture, with sound on E1 (1kHz or 10kHz)
TAPE		MEAS. EQ.	SPEC.
Blank Tape		Frequency Counter	70kHz ±10kHz

8.7.2 Adjustment of bias current [3625]:

Purpose:
To set the optimum record bias current.
Symptom, if incorrectly set:
If the audio level is too high, the higher frequencies of the linear sound are too low.
If the level is too low, the higher frequencies are too strong and sound distortions increase.

TP	ADJ.	MODE	INPUT
C2613 (TP BIAS)	R3625	Record E1	PAL white picture, with sound on E1 (1kHz or 10kHz)

TAPE	MEAS. EQ.	SPEC.
Blank Tape	AC Millivoltmeter, Oszilloskop, Video Pattern Generator	$14V_{RMS}$ ±$1V_{RMS}$ (70kHz)

Checking the 'bias' adjustment:
Apply a sine-wave signal with an amplitude of 50mVeff to the SCART audio input. Record the 1kHz signal and 10kHz signal for 30 seconds each. Play back the recording and check that the amplitude difference is in the ±3dB range. If this is not the case, correct the value for the magnetic biasing current. If the treble is too low, the bias current should be reduced slightly. If the distortion is too great, the bias current should be increased slightly.
(approximate value: +1V = -1dB Treble).

8.7.3 Adjustment of the audio linear playback amplitude [IIC-bus]:

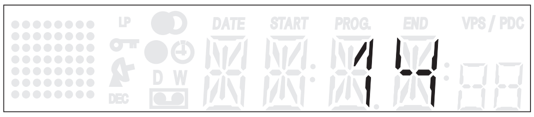
Purpose:
To set audio part amplification LA71595 [7004-A]
Symptom, if incorrectly set:
Playback sounds too low or too loud.

Enter the service test program and, whilst step display is flashing, enter the step number 62, using the numerical keys.

TP	ADJ.	MODE	INPUT
Pin 1 of Scart 1 (Audout)	refer to description	SP Self-recording and Playback, Service mode call up Step 62	(Video white picture) Audio in Scart 1, $700mV_{RMS}$, 1kHz

TAPE	MEAS. EQ.	SPEC.
Blank Tape	AC Millivoltmeter, Video Pattern, Frequency Generator	$500mV_{RMS}$ ±50mV

By pressing the SELECT button whilst step 62 is flashing, the output select is switched to Mono and the display shows, for instance:



- Make a recording of the audio signal on E1.
- Connect the millivoltmeter to Scart1 Pin1(Audio out) and play the recording back.
- The level on Scart 1, Pin1 (Audio out) can be adjusted to the set value by pressing the UP (value increases) or DOWN keys (value decreases).
- (The amplitude changes by 1 dB each time the key is pressed).
- The range is shown in the display by the numbers 0...31.
- The value is automatically stored in the EE-PROM each time the button is pressed.

8.8 Display Control (AIO2)

Service tasks after replacement of the clock quartz [1170] or the EEPROM:

8.8.1 Clock frequency output

Purpose:
Setting the exact clock function.
Symptom, if incorrectly set:
The clock is too fast or too slow.

Remove the Motherboard from the frame and bring it into the service position.
Enter the service test program and, whilst step display is flashing, enter the **step number 99**, using the numerical keys.

TP	ADJ.	MODE	INPUT
7899-A pin 71 CLOCK ADJ.		Stop Service Mode call up Step 99	

TAPE	MEAS. EQ.	SPEC.
	Frequency counter with 6 digits	refer to description below

After entering with SELECT, the display is switched off and the watch symbol is flashing, no further function can be carried out. At the CLOCK ADJUST measuring point [7899-A, pin 71], the uncorrected clock frequency of approx. 8192 Hz is always output.
Measure the output frequency with the calibrated counter (minimum resolution of 6 digits) and note down the value (f_{mess}).

Determining the deviation (in ppm):
f_{mess}..... measured frequency
f_{nom}........target frequency (8192,00 Hz)
Deviation = 1x106 x (f_{mess} - f_{nom}) / f_{nom}

Determining the correction value for Step 53:
Correction value = Deviation / 0.763 + 128 (round off to whole number)

The calculated **correction value** must be between 0 and 255 (change quartz otherwise), and must be entered in Step 53 and saved.
This step can either be exited by performing a main power source reset, after which the service program must be entered again **or by pressing any key on the set**, before step 53 can be entered.

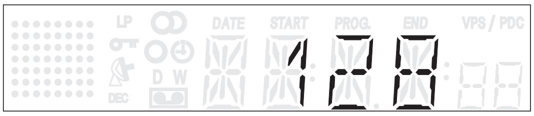
Example:
f_{mess}=8191.97Hz f_{nom} =8192.00Hz

Deviation = 1×10^6 x (8191.97 - 8192.00) / 8192.00 = **-3.662**
Correction value = -3.662 / 0.763 + 128 = 123.20 = **123**

8.8.2 Inputing the clock correction

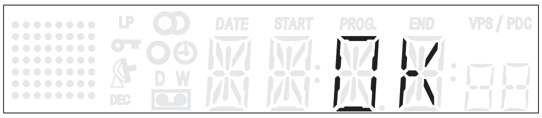
Before carrying out step 53, the correction value must be established in step 99.

By pressing the SELECT key whilst **step 53** is flashing, the display shows, for instance (128 is the default value of an empty EEPROM):

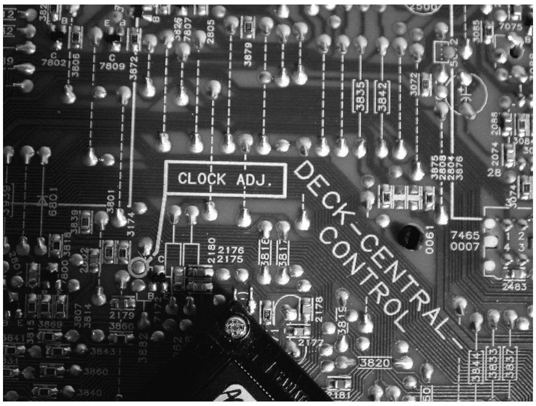

LP
DATE
START
PROG.
END
VPS / PDC
D W
DEC
128

Using the numerical keys of the remote control, the established correction value from **Step 99** is entered as a 3-digit number (value must be between 0 and 255).

After pressing the OK key on the remote control, the entered code is stored, the display shows OK for approx. 3 seconds and then the stored value in decimal format.


LP
DATE
START
PROG.
END
VPS / PDC
D W
DEC
OK

In case of an invalid entry (value >255), the activation of the OK key causes the content of the last stored value to be displayed and OK does not appear in the display.
To leave the step press Select.


CLOCK ADJ.
DECK-CENTRAL-CONTROL
3835
3842
3879
3801
2176
2175
7465
3820

Adjustment table of the clock frequency:
Measured frequency in Hertz:

measured clock frequency pos. 7899-A pin 71 [Hz]	corrected value for Step 53 input	Time deviation minutes / year
8192,00	**128**	0,0
8191,98	**125**	-1,2
8191,96	**122**	-2,4
8191,94	**118**	-3,7
8191,92	**115**	-4,9
8191,90	**112**	-6,1
8191,88	**109**	-7,3
8191,86	**106**	-8,5
8191,84	**102**	-9,8
8191,82	**99**	-11,0
8191,80	**96**	-12,2
8191,78	**93**	-13,4
8191,76	**90**	-14,6
8191,74	**86**	-15,9
8191,72	**83**	-17,1
8191,70	**80**	-18,3
8191,68	**77**	-19,5
8191,66	**74**	-20,8
8191,64	**70**	-22,0
8191,62	**67**	-23,2
8191,60	**64**	-24,4
8191,58	**61**	-25,6
8191,56	**58**	-26,9
8191,54	**54**	-28,1
8191,52	**51**	-29,3
8191,50	**48**	-30,5
8191,48	**45**	-31,7
8191,46	**42**	-33,0
8191,44	**38**	-34,2
8191,42	**35**	-35,4
8191,40	**32**	-36,6
8191,38	**29**	-37,8
8191,36	**26**	-39,1
8191,34	**22**	-40,3
8191,32	**19**	-41,5
8191,30	**16**	-42,7
8191,28	**13**	-43,9
8191,26	**10**	-45,2
8191,24	**6**	-46,4
8191,22	**3**	-47,6
8191,20	**0**	-48,8

measured clock frequency pos. 7899-A pin 71 [Hz]	corrected value for Step 53 input	Time deviation minutes / year
8192,00	**128**	0,0
8192,02	**131**	1,2
8192,04	**134**	2,4
8192,06	**138**	3,7
8192,08	**141**	4,9
8192,10	**144**	6,1
8192,12	**147**	7,3
8192,14	**150**	8,5
8192,16	**154**	9,8
8192,18	**157**	11,0
8192,20	**160**	12,2
8192,22	**163**	13,4
8192,24	**166**	14,6
8192,26	**170**	15,9
8192,28	**173**	17,1
8192,30	**176**	18,3
8192,32	**179**	19,5
8192,34	**182**	20,8
8192,36	**186**	22,0
8192,38	**189**	23,2
8192,40	**192**	24,4
8192,42	**195**	25,6
8192,44	**198**	26,9
8192,46	**202**	28,1
8192,48	**205**	29,3
8192,50	**208**	30,5
8192,52	**211**	31,7
8192,54	**214**	33,0
8192,56	**218**	34,2
8192,58	**221**	35,4
8192,60	**224**	36,6
8192,62	**227**	37,8
8192,64	**230**	39,1
8192,66	**234**	40,3
8192,68	**237**	41,5
8192,70	**240**	42,7
8192,72	**243**	43,9
8192,74	**246**	45,2
8192,76	**250**	46,4
8192,78	**253**	47,6

9. Circuit descriptions and List of abbreviations

9.1 Switched-mode power supply PS (PS Part)

9.1.1 Technical data:

Mains voltage	:	195-264 Vrms
Maximum output	:	15W / 40W (continuous / maximum output)
Operating frequency	:	40 kHz
Efficiency	:	approx. 75 % at maximum output

Six different direct voltages are supplied on the power supply outputs.

9.1.2 Functional principle:

This power supply functions in a similar way to a blocking oscillator. In the supply voltage part [1300 to 2318], the mains voltage is rectified and buffered in the capacitor [2318]. From this direct voltage [2318] energy is transferred into the transformer [5301, pins 1-3] during the conductive phase of the switching transistor [7302] and is stored there as magnetic energy. This energy is passed to the secondary outputs on the power supply in the in the blocking phase of the switching transistor [7302]. With the switch-on time of the switching transistor [7302], the energy transferred in every cycle is regulated in such a way that the output voltages remain constant regardless of changes in the load or input voltages. The power transistor is activated using the integrated switch [7303] Fig.1.

9.1.3 Supply voltage part

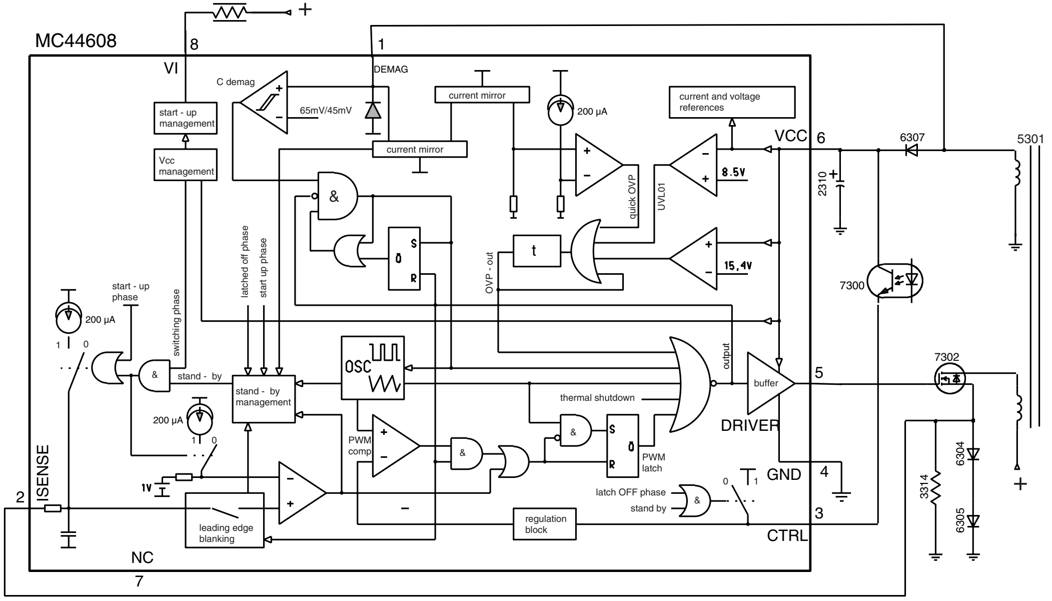
The supply voltage part extends from the mains socket [1300] to the capacitor [2318]. Using the diodes [6310, 6311, 6312 and 6313] the a.c. supply voltage is rectified and buffered using the capacitor [2318]. The line reactor [5305] and capacitor [2316] create a filter to keep interference arising in the power supply away from the mains. Components [1302], [3326] and [3323] protect the power supply against short-term overvoltages in the mains, e.g. caused by indirect effects from lightning.

9.1.4 Start-up with Mains-on:

Following connection to the mains, the capacitor [2310] is loaded via the start-up resistor [3318] and a current source between pin 8 and pin 6 on the IC [7303]. Once the voltage on [2310] and therefore the supply voltage Vcc on the IC [7303] has reached approx. 13V, the IC starts up and issues pulses to its output on pin 5. These pulses are used to control the gate on the power transistor [7302] (see Fig.2). The frequency has a fixed setting in the IC (approx. 40 kHz). The current input on the IC is approx. 5 mA in normal mode.
If Vcc drops to below approx. 10V (e.g. with power limitation) or if Vcc exceeds around 15V (interruption of the control loop), the output on the IC [7303, pin 5] is blocked. All output voltages on the power supply, and therefore also Vcc, decrease. Once Vcc has dropped to below approx. 6.5V, a new start-up cycle begins. (See also “Overload, Power Limitation, Burst Mode“ section)

9.1.5 Normal mode:

With the power supply in normal mode, the periodic sequences in the circuit are divided primarily into the conductive and blocking phase of the switching transistor [7302]. During the **conductive phase** of the switching transistor [7302], current flows from the rectified mains voltage to the capacitor [2318] through the primary coil on the transformer [5301, pins 1-3], the transistor [7302] and resistors [3314, 3331] to earth (see Fig.1). The positive voltage on pin 1 of the transformer [5301] can be assumed to be constant for a switching cycle. The current in the primary coil on the transformer [5301] increases linearly in the pattern of U=L*di/dt. A magnetic field representing a certain volume of the primary current is formed inside the transformer. In this phase, the voltages on the secondary coils are polarised in such a way that the diodes [6300, 6301, 6306, 6308 and 6309] block. From the controller on [7301], a current is supplied to the CTRL input on the IC [pin 3, 7303] via optocoupler [7300]. Once the switch-on time for the switching transistor [7302] has been reached, which corresponds to the current supplied on the CTRL input, the switching transistor is switched off.


3318
+
MC44608
8
1
VI
DEMAG
C demag
65mV/45mV
start - up management
Vcc management
current mirror
current mirror
200 µA
current and voltage references
VCC
6
6307
5301
2310
8.5V
quick OVP
UVL01
&
S
Q̄
R
t
OVP - out
15,4V
7300
latched off phase
start up phase
switching phase
start - up phase
200 µA
1
0
&
stand - by
stand - by management
OSC
output
buffer
5
7302
thermal shutdown
DRIVER
200 µA
1
0
PWM comp
&
&
S
Q̄
R
PWM latch
1V
ISENSE
2
leading edge blanking
regulation block
latch OFF phase
stand by
&
0
T1
GND
4
3
CTRL
3314
6304
6305
+
NC
7

Once the switching transs been switched off, the **blocking phase** begins. No more energy will be transferred into the transformer. The inductivity of the transformer will still attempt to maintain the current which has flowed through it (U=L*di/dt) at a constant level. As the primary current circuit is interrupted by the shut-off switching transistor [7302], the current will flow through the secondary coils.
The polarity of the voltages on the transformer is reversed, which means that the diodes [6300, 6301, 6306, 6308 and 6309] become conductive and current flows into the capacitors [2301, 2305, 2309, 2311 and 2312] and the load. This current is also ramp-shaped (di/dt negative, therefore decreasing).
The **control adjustment** for the switched-mode power supply is made by changing the conductive phase of the switching transistor (see Fig.2), so that either more or less energy is transferred from the rectified mains voltage to [2318] in the transformer. The control information is provided by the control element [7301]. This element compares the 5V output voltage via the voltage dividers [3300, 3306, 3336] with an internal 2.5V reference voltage. The output voltage from [7301] passes via an optocoupler [7300] (for the metallic isolation of the primary and secondary parts) as the current value to pin 3 on the IC [7303]. The switch-on time for the switching transistor [7302] is inversely proportional to the value of this current.

9.1.6 Overload, power limitation, burst mode:

With an increasing load on one or more power supply outputs, the switch-on time for the power transistor [7302] also increases, and thus also the peak value of the delta-shaped current through this power transistor. The equivalent voltage circuit for this current profile is passed from resistors [3314] and [3331] via [3312] and [3347] to pin 2 on the IC [7305]. If the voltage on pin 2 reaches 1V in one switching cycle, the conductive phase of the switching transistor is ended immediately. This check is made in each individual switching cycle. This process ensures that no more than approx. 48W can be taken out of the mains (**= power limitation**).
If the power supply reaches the power limit, the output voltages and the supply voltage Vcc on pin 6 of the IC [7303] will be reduced following further loading. If Vcc is less than approx. 10V at any point during this process, the output on the IC [7303, pin 5] is blocked. All output voltages and Vcc are reduced. Once Vcc has dropped to below approx. 6.5V, a new start-up cycle begins. If the overload status or short-circuit remains, the power limitation will be activated immediately and the voltages will continue to be reduced, followed by another start-up attempt (Burst Mode). The amount of power taken up from the mains in burst mode is low.

9.1.7 Standby mode:

In the ‘Standby‘ operating mode on the device, the ’STBY‘ control line is used to shut off the output voltages 14AL, 5VA and 5VD on the power supply to minimise the amount of power taken up from the mains. The supply to the display heating can also be switched off using the ‘I1WSTBY‘ control line. The power supply itself will continue to function continuously in the ‘Standby‘ operating mode with a switching frequency of 40kHz.

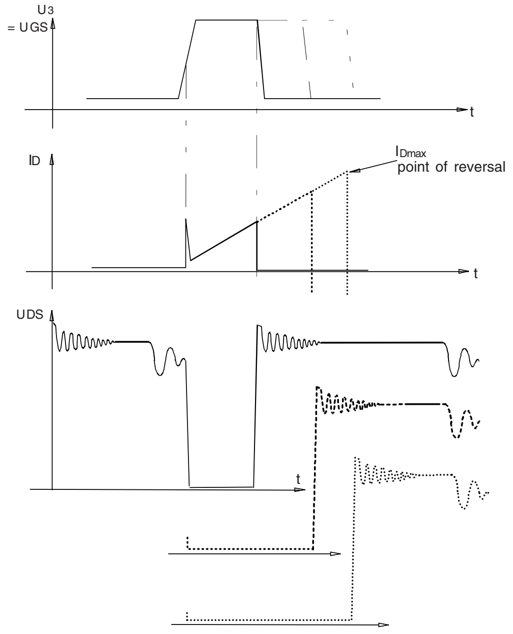


Figure 9-1

9.2 Operating unit DC (DC part)

The microcontroller TMP93CT76F [7899-A] is a 16 bit microcontroller fitted with 128Kb ROM and 2.5Kb RAM.
It is the core element of the operating unit, fulfilling the following tasks with the respective functional groups:

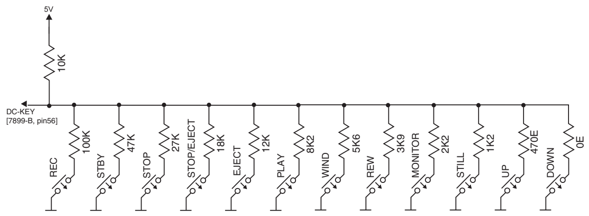
- Integrated VFD driver
- Timer
- Evaluation of the keyboard matrix
- Decoding the remote control commands from the infra-red receiver pos. 6170
- Activation of the display
- Back-up mode

In normal operation, the P is operated in dual-clock mode, i.e. both quartzes [1170, 1171] oscillate. The time is derived from the slow quartz [1170] (32.768 kHz), and the fast quartz [1171] (16MHz) is used to generate the system clock frequency.
In case of a mains failure (back-up mode) the P is not reset, but instead the mains failure is registered by the IPOR interrupt 3 [7899-B] (pin 67) and the P is moved into “Sleep mode” (low power consumption). The 16MHz quartz is turned off and the 32kHz quartz is then used as the clock and system clock frequency. The operating voltage for the AIO is buffered by a back-up cell [pos. 2174, 2172]. A diode [6171] prevents this gold capacity from discharging.

9.2.1 Evaluation of the keyboard matrix

There are 12 different keys. Each key function is assigned a fixed voltage value. This value is decoded using an analogue/digital (A/D) port (7899-B, pin 56). Each mechanical key position on the printed board can adopt any key function via a coding resistor. Pressing keys simultaneously may lead to undesired functions!

Schematic:


5V
10K
DC-KEY
[7899-B, pin56]
REC
100K
STBY
47K
STOP
27K
STOP/EJECT
18K
EJECT
12K
PLAY
8K2
WIND
5K6
REW
3K9
MONITOR
2K2
STILL
1K2
UP
470E
DOWN
0E

9.2.2 IR receiver and signal evaluation

The IR receiver [6170] includes a selective, controlled amplifier in addition to a photo-diode. The photo-diode changes the received transmission (approx. 940nm) in electrical pulses, which are then amplified and demodulated. On the output of the IR receiver [7220] a level lift 0V/5V pulse sequence, which corresponds to the envelope curve of the received IR remote control command, can be measured. This pulse sequence is input into the controller for further signal evaluation via input IRR [7899-B, pin 46].

9.2.3 Activation and function of the VFD display

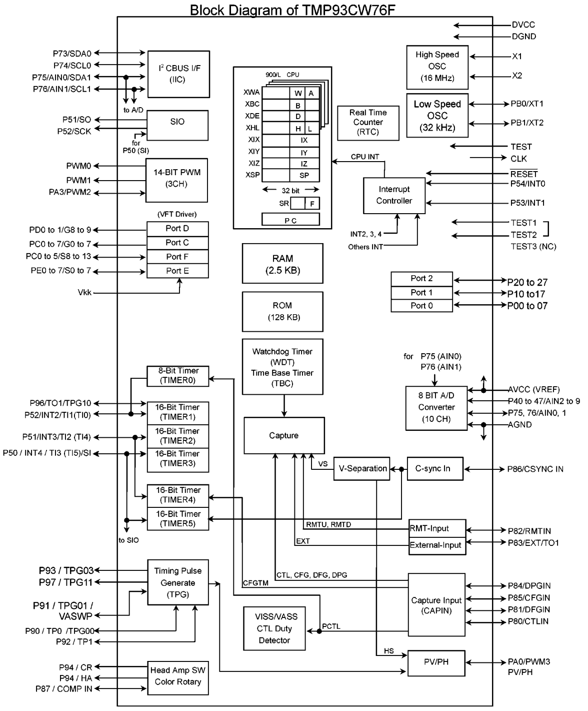
In principle, the VFD display [7170] is a tube triode in which the heating filaments in the tube serve as cathodes (F+,F-). The 7 grids (G1 - G7) are activated via PC2 - PC7, PD0 on the controller, and the 16 anodes (P1 - P16) are controlled via ports PE0 - PE7, PF0 - PF7, PC0, PC1 on the controller, each with a positive potential compared to the cathode.
The grids and anodes (digits and symbols to be displayed) are activated in the time-multiplex procedure, voltage lift 5V/ -18V. A dimmer function is generated using pulse-width modulation of the grid control signals. At maximum display brightness, the pulse width for each grid is 2.16 ms. It can be reduced, controlled using software, which reduces the visual brightness of the VFD display accordingly.
A digit or symbol is only illuminated if the corresponding anode and the surrounding grid are switched simultaneously to 5V for a certain time within a scanning period. The electrons emitted from the cathode are accelerated by the positively charged grid and hit the luminous layer of the anode which is also positively charged.
During the remainder of the scanning period, the corresponding grid and parts of the anode are at -18V, due to the internal pull-down resistors in the controller. This potential is still lower than the average cathode potential of approx. -15V, prevents the acceleration of electrons, thus causing the relevant grid and anode segments to go dark.
The heating direct voltage of the display (U = 3.5V) is supplied from the power supply via lines HELO or HEHI to pins F+ and F- to the VFD display. Resistors [3070] and [3071] restrict F- to approx. -15V.

9.3 Central Control AIO (AIO part)

The microcontroller (µC) TMP93CT76F [7899-B] includes the following functions:

- PWM outputs
- A/D converters
- Composite sync input
- Special servo inputs for VCR functions
- I^2C-BUS interface
- Shuttle evaluation

Block Diagram of TMP93CW76F


DVCC
DGND
P73/SDA0
P74/SCL0
P75/AIN0/SDA1
P76/AIN1/SCL1
I² CBUS I/F (IIC)
to A/D
P51/SO
P52/SCK
SIO
for P50 (SI)
PWM0
PWM1
PA3/PWM2
14-BIT PWM (3CH)
(VFT Driver)
PD0 to 1/G8 to 9
PC0 to 7/G0 to 7
PC0 to 5/S8 to 13
PE0 to 7/S0 to 7
Port D
Port C
Port F
Port E
Vkk
900/L CPU
XWA
XBC
XDE
XHL
XIX
XIY
XIZ
XSP
W
A
B
D
H
L
IX
IY
IZ
SP
32 bit
SR
F
P C
Real Time Counter (RTC)
High Speed OSC (16 MHz)
X1
X2
Low Speed OSC (32 kHz)
PB0/XT1
PB1/XT2
TEST
CLK
CPU INT
RESET
P54/INT0
Interrupt Controller
P53/INT1
INT2, 3, 4
Others INT
TEST1
TEST2
TEST3 (NC)
RAM (2.5 KB)
ROM (128 KB)
Port 2
Port 1
Port 0
P20 to 27
P10 to17
P00 to 07
Watchdog Timer (WDT) Time Base Timer (TBC)
for P75 (AIN0) P76 (AIN1)
8 BIT A/D Converter (10 CH)
AVCC (VREF)
P40 to 47/AIN2 to 9
P75, 76/AIN0, 1
AGND
8-Bit Timer (TIMER0)
P96/TO1/TPG10
P52/INT2/TI1(TI0)
16-Bit Timer (TIMER1)
P51/INT3/TI2 (TI4)
16-Bit Timer (TIMER2)
P50 / INT4 / TI3 (TI5)/SI
16-Bit Timer (TIMER3)
Capture
VS
V-Separation
C-sync In
P86/CSYNC IN
16-Bit Timer (TIMER4)
16-Bit Timer (TIMER5)
to SIO
RMTU, RMTD
RMT-Input
P82/RMTIN
EXT
External-Input
P83/EXT/TO1
P93 / TPG03
P97 / TPG11
Timing Pulse Generate (TPG)
P91 / TPG01 / VASWP
P90 / TP0 /TPG00
P92 / TP1
CFGTM
CTL, CFG, DFG, DPG
Capture Input (CAPIN)
P84/DPGIN
P85/CFGIN
P81/DFGIN
P80/CTLIN
VISS/VASS CTL Duty Detector
PCTL
HS
PV/PH
PA0/PWM3 PV/PH
P94 / CR
P94 / HA
P87 / COMP IN
Head Amp SW Color Rotary

9.3.1 Analogue interface to the C:

The following analogue levels are supplied to the µ C's internal analogue/digital (A/D) converter:

TAE/TAS	Tape End / Tape Start Detection
TRIV	Tracking Information Video
TRIA	Tracking Information Audio
AGC	Automatic Gain Control
AFC	Automatic Frequency Control
8SC1/2	Pin 8 Scart1 or Scart2 switching voltage
Key-in	Keypad evaluation

9.3.2 Tape end - LED control :

The LED current is switched using transistor [7804]. The ON time is approx. 1 msec and the OFF time approx. 12 msec during playback and 1msec to 5.5msec during the winding functions.
The LED current is typically 150 mA. In order to prevent interference from the relatively high pulsed current 'spreading' through the entire unit, the LED is fed from the 14VM1, and filtered by 2 resistors [3800, 3805] with 10R each and a 220µF electrolytic capacitor [2803].

9.3.3 CMT detection (video detection with CSYNC)

This has been extended due to identification problems with weak transmission signals and video signals not conforming to the STANDARD (common channel interference). The CSYNC line is supplied to the µP [7899-B] on pin 50. A hardware integration [7807,7808,7809] of the video pulse compensates the interference generated by the common channels and weak signals.

9.3.4 EE-PROM

The EE-PROM [7818] is a non-volatile memory which can be erased and written to electrically. (Data remains even if the operating voltage fails). Data specific to the device such as the X distance, head changeover position, preset stations, optional bytes etc. is stored in the EE-PROM [7818]. The data is accessed by the µP via the I^2C bus.

9.3.5 Easy link (P50)

For the communication between the TV set, video recorder and the peripheral devices, a bi-directional single-wire bus is used, which runs via pin 10 to scart socket 1.
The output signal is generated on pin 84 of the µC [7899-B], pin 68 is the signal input.

9.3.6 Shuttle

The shuttle is connected to the motherboard on plug pos.1982. It is a binary coded rotary switch with a rotation angle of +/- 70 degrees and 16 switch positions. These are input and evaluated via four lines (shuttle b1 - shuttle b4) to the input ports P24 - P27 [7899B pins 2-5].

9.3.7 Satmouse

For activating a sat-receiver via an external infrared electronic transmission unit (Satmouse) a bi-directional data line, a short-circuit proof +5V and earth are provided via a 3-pin 3.5mm jack [1941].
The +5V is limited to approx. 140 mA using a current limiting switch [7812 and peripherals].

9.4 Deck electronics DE (DE part)

The deck interface IC MP63100FP [7463] contains the following functional groups:

- CTL stage (tape synchronisation)
- Sensor interface
- Power on reset
- Head drum motor driver
- Loading motor driver
- Capstan motor control

9.4.1 CTL stage

The IC M63100FP [7463] contains a read/write stage for the CTL track with the option of overwriting an existing CTL track without any interference. The playback stage is fitted with a “digital” five-stage AGC. This logic circuit identifies the size of the output signal supplied by the CTL head, and then selects the best amplification ratio in the playback stage using comparators.
The CTL head voltage can therefore vary greatly, if V_{max} / V_{min} is great. The slowest tape speed is in LP mode. The fastest speed is adjusted during rewind. To ensure that the duty cycle in the tape sync is always reproduced correctly in the conditions mentioned above (important for detecting VISS marks), the amplifier must not be overdriven.

The five-stage AGC alone cannot cover the large dynamic range of the input voltage. The amplifier is therefore also equipped with a low pass characteristic (fg = 3kHz typ.; internal).
In parallel with the CTL head is the RC cell comprising capacitor [2479] and resistor [3471]. The capacitor [2479], together with the CTL head inductivity, causes a resonance step-up at around 10 kHz and the resistor [3471] suppresses this step-up. This creates an aperiodic transient response in the resonance. Beyond the resonance frequency, there is an adjustment in terms of a steep fall in the frequency transmission characteristic. This effectively suppresses high-frequency pick-ups. The CTL head signal amplitude in standard play is around 1mVp (typ.) which means that the amplification for the playback amplifier must be correspondingly high. To avoid offset problems, a 100 F electrolytic capacitor [2490] is fitted in the negative feedback branch for DC decoupling.
The polarity of the playback amplifier can be changed using the Video Index Search System (VISS) voltage. This is the only way in which the P can write a VISS mark on the tape without spikes. The Write/Read (W/R) signal is used to switch over between record and playback:
W = “H“, R = “L“.

9.4.2 Power on reset (POR) generator

The POR generator contained in the M63100FP [7463] requires only one external capacitor [2477], which specifies the length of the POR pulse. For 33 nF, t_{POR} is approx. 30ms. The response threshold of the reset circuit is between 4.5 and 4.8 V. Supply fluctuations which are shorter than tPOR/100 area and which do not fall below 4.0 V, do not trigger the POR. The P is reset using the inverted POR.

9.4.3 The sensor interface :

The four comparators in the M63100FP [7463] are used to convert sensor signals to the logic level. The outputs are overload protected by a current limiter and thermal overload protection. Only the non-inverting input on each comparator is accessible from the outside. The other inputs are connected to an internal reference of 2.5V. The fixed hysteresis of the comparators of approx. 18 mV is also located internally.

The comparators are connected as follows:

Comparator 1: In = FTA, pin 39; Out = FTAD, pin 34:
FTA = threading tachometer. This signal comes from a forked light barrier in the deck. An infra-red light beam is interrupted by a 4-blade impeller (butterfly). The output amplitude for the light barriers should be less than 2V for the low level and greater than 3V in the high level to ensure a correct evaluation process. An additional hysteresis is created with a resistor [3476]. For unit versions <1W and FOME the external operation amplifier [7530B] is used to reduce the power consumption in <1W mode.

Comparator 2: In = WTR, pin 38; Out = WTRD, pin 33:
WTR = Winding tachometer right, from a reflection photoelectric barrier. The level is the same as for the FTA.

Comparator 3: In = WTL, pin 37; Out = WTLD, pin 31 :
WTL = Winding tachometer left, from a reflection photoelectric barrier. The level is the same as for the FTA.

Comparator 4: In = FG, pin 35; Out = FGD, pin 30:
FG = capstan tachometer. This signal stems from an amplifier for the tachometer hall sensor on the motor unit [1946 pin 4]. The output impedance is 10 kOhm. The amplitude of the virtually sinusoidal signal is normally 1 Vp. It should not fall below 300 mVpp. It is AC-coupled via a capacitor [2485]. In order for a bias current to flow, the input

pin 31 must be passed via a resistor [3474] to the reference voltage on pin 4. A capacitor [2480] for filtering out high-frequency interference is arranged in parallel to the bias resistor.

9.4.4 Interface to the head drum motor driver part

The head drum control voltage (speed and phase control information) is output via a P-output (7899-B pin 35; PWM 14-bit). This pulse-wide modulated signal is fed to the motor driver IC M63100FP [7463 pin 11] and integrated with the capacitor [2469]. This IC already has a completely integrated ‘start-up’ circuit fitted. For the commutation, the head drum motor driver uses the e.m.f. on the non-current carrying motor coil (transformer principle). The motor speed is also discharged from there at the same time. The phase of the head disc is discharged from a position coil. The speed and phase are multiplexed into one signal [7463 pin 6] and output, which means that the falling edge of the signal is available with a positive edge for the speed (FG/450Hz) and at 25Hz for the position pulse (PG).
The motor driver M63100FP [7463] is connected to the head drum motor on the motherboard using plug [1948].

- DRUM is the speed-phase control signal. The resolution is 14 bit.
- PG/FG is the combined POS/tachometer signal from the M63100FP [7463].

9.4.5 Interface to the loading motor driver part:

The loading motor driver part is constructed for use as a bridged dual power operations amplifier (OPAMP). It can supply max. +/-0.8A output current. The output current is limited to approx. 0.7A by the internal resistance of the loading motor (18 Ohm typ.) (start-up or motor is blocked). Between the IC outputs [7463, pins 22 and 24] there is a “Boucherot” circuit [3467] 1E, [2474] 100 nF for suppressing a spurious 3MHz oscillation from the output stage. One half of the bridge is controlled via the TMO line on pin 27 and acts as a comparator. The other half is an amplifier integrator with a 3.9 gain. A change in the input voltage (THIO) of between 0 and 5V on pin 25 results in a change in the output voltage of between 0V and almost Ub. With 50% modulation (THIO = 2.5 V) pin 24 has approx. 7 V. The 100nF capacitor [2473] in the negative feedback of the op-amp filters out the PWM frequency of approx. 39kHz. During POR, the P issues “L” to the THIO line, whilst TMO is “H”. This ensures that no current flows in the motor for the duration of the POR pulse. This prevents the motor being destroyed in case of prolonged running or blockage. This arrangement also has a disadvantage, however. This is that if the 5 V supply fails (e.g. because the 5V fuse has blown), residual voltages may be passed to the IC inputs via the adjacent 14 V voltages. These residual voltages trigger the comparator and the op-amp in opposite ways, causing a short-circuit in the blocked loading motor after about a minute. To get around this problem, a separate voltage divider is used internally for the comparator. Both outputs on the M63100FP [7463] are then in “common mode” if this error occurs.

9.4.6 Interface to the capstan motor

The driver IC on the capstan motor is activated via connector [1946].
CAP is the signal for the capstan speed. This voltage may vary without load between 0 and 5 V.
The rotational direction of the motor is determined using CREV (capstan reverse). The maximum current input for the motor is limited to 1A. Typical values in PLAY mode are 0.2 ... 0.3 A.

9.5 Front end FV (FV part)

9.5.1 The front end comprises the following parts :

- TUMOD = Tuner (+ Modulator Option) (+Booster Option) (+Passive Loop Through Option)
- IF amplifier & video demodulator IC TDA 9817, [7705] with FM - PLL demodulator
- IF amplifier & video demodulator IC TDA 9818, [7705] with FM - PLL and AM demodulator
- FM stereo decoder TDA 9873 [7760]
- Multi-standard FM stereo, AM, NICAM decoder MSP3415D [7761]

9.5.2 The front end has been designed to receive the following systems:

- PAL B/G with FM stereo
- PAL 1 or PAL BG with NICAM stereo
- PAL BG with NICAM and FM stereo
- PAL BG/I SECAM L/L’ with NICAM and FM stereo
- PAL BG SECAM DK with NICAM and FM stereo

- PAL B/G = /01,/02/16
- PAL I = /05 Pal I with UHF reception
- PAL I Ireland = /07 Pal I with VHF/UHF reception
- SECAM L,L‘, PAL BG/I = /39
- PAL B/G, SECAM DK = /58

The relevant layout is given in the version list on the circuit diagram.

9.5.3 Tuner modulator (TUMOD)

The tuner and modulator are fitted into the same housing. Both the tuner and the modulator are PLL-controlled. The reception frequency or modulator frequency is set using the IIC bus.
The amplification is determined by the AGC voltage at pin 5 [1701] (for operation, see IF demodulator section).

9.5.4 IF selection

The IF frequency of the video carrier is 38.9 MHz for all systems except SECAM L’ (33.9 MHz).
For PAL BG-SECAM DK and for PAL BG/I-SECAM L/L´ a quasi-split audio system is used; i.e. for video and audio carriers, separate surface-wave filters (OFW) are required [1704, 1703]. For all other standards an intercarrier system is used; i.e. a common OFW with audio stair-step can be used [1704] for video and audio carriers.
For the PAL BG/I-SECAM L/L’ version, an additional circuit for suppressing the adjacent channel audio carrier is provided, which is set using coil [5704] to maximum suppression at 40.4MHz.

9.5.5 IF demodulator

TDA 9818
The IF signal from the tuner is processed by another demodulator IC of type TDA 9818 [7705]. The TDA 9818 is used to demodulate pos. or neg. modulated video carriers. It is possible to generate a QSS-audio-IF signal or an intercarrier IF signal for demodulation in the audio demodulator [7761]. For the best possible video signal performance the IF signal is conveyed via an OFW [1704] according to the standard. The audio-IF carrier is selected in the audio OFW [1703] which is switched for SECAM L’. The output signal for this OFW is further processed in the TDA 9818. FM carriers are converted from the IF level into the audio IF position and further processed in the audio demodulator. The AFC coil [5702] on the TDA 9818 is adjusted so that when a frequency of 38.9 MHz is supplied to

the IF output of the tuner, the AFC voltage on pin 17 on the TDA 9818 is 2.5V. The setting of the picture carrier frequency for SECAM L in the TDA 9818 is achieved by connecting pin 7 of the IC via a potentiometer [3730] to earth. The AFC voltage on pin 17 TDA 9818 should then also be 2.5V at 33.9 MHz. The HF-AGC is set using the AGC controller [3707] so that with a sufficiently large input signal (74 dBV), the voltage at the IF output on the tuner [1701, pin 17] is 550 mVpp. The setting must be carried out when the audio carrier is switched off. The demodulated video signal appears on pin 16 [7705]. The video drop [1705] reduces adjacent channel sound carrier and sound carrier remainders in the video.

TDA 9817

As for TDA9818, without the option for processing AM audio and positive video modulation (SECAM L,L').

9.5.6 Audio demodulator

Multi-standard audio processor MSP 3415D

The MSP 3415D [7761] is a multi-standard sound processor which can demodulate FM Mono/Stereo, NICAM and AM signals. The incoming signal is first controlled and then digitised. The digital signal is then demodulated in 2 separate channels. In the first MSP channel, FM and NICAM (B/G/I/D/K) are demodulated, whereas in the second MSP channel, FM and AM is demodulated again (NICAM L corresponds to NICAM B/G). These demodulated signals are selected digitally in the I/O and switched to the D/A converter on the outputs. Amplitude and bandwidth of the demodulated audio signals can be determined in the MSP using the corresponding commands via the I^2C bus. This means that the setting required for the best possible performance can be made.

FM stereo audio decoder TDA 9873

The TDA 9873 [7760] is a multi-standard A2 audio processor which can demodulate FM mono/stereo signals. The audio IF SIF2 is passed from pin 3 [7705] to pin 25 [7760]. The demodulated stereo signals AFL and AFR I^2C bus are available controlled on pins 1 and 2.

9.6 Video signal processing VS (VS part)

9.6.1 Switchover functions in the signal electronics IC LA71595M [7004]:

The signal electronics IC LA71595M [7004] are controlled via the I^2C Bus on pins 23 and 24 by the AIO.
As groups 5 and 6 can only be transferred with a change in HP1, it must be ensured that during measurements the HP1 line is always connected to the SE IC or replaced by a corresponding signal.

REC/PB via IIC bus

During RECORD pin 30 must be passed via [7009] on 5V (IREV=LOW) to activate the video write current stages. To keep the transient condition of the write current as short as possible, the signal electronics IC is set to REC via IIC bus before the pin 30 change.

PAL/SECAM/MESECAM/NTSC via IIC bus

SP/LP/SLP via IIC bus

VIDEO INPUT SELECTOR SWITCH via IIC bus

In 1-scart units a distinction is made via the IIC bus between VFV (pin 36 / VID2) and VBS which corresponds to VIN1 (pin 38 / VID1). In 2-scart units the video input selection is made via IIC bus in the STV6401 [7904] and the SE IC is always on VBS (pin 38 / VIN1).

VIDEO ENTRY

The feature frame pulse FFP signal on pin 26 is used to enter the artificial picture pulse for playback features and the test picture for the unit installation procedure:

Loop through	< 0.8V
Test picture	= 1.2 ... 3.8V
Artificial picture pulse	> 4.2V

LP/SP head pair switchover

The switchover between the long play LP head pair and the standard play SP head pair is made via the HSC signal (pin 25).

4/x scanner in play back:SP head pair:1.2V <= HSC <= 2.8V
LP head pair: 0V<= HSC <= 0.8V
2/x scanner in play back:always 3.2V <= HSC <= 5V

Head switchover

The video head switchover is made using the HP1 signal (pin 11). To keep audio linear interference as low as possible, the HP1 polarity should be selected to be inverse and the HP1 level should be the same as the CROT signal on pin 10.

PB:	SP1 / LP1:	1.2V <= HP1 <= 2.8V
	SP2 / LP2:	0V <= HP1 <= 0.8V

Envelope curve comparator

If the ENVC signal (pin 94) is HIGH, the FM envelope curve on the LP head is greater than that on the SP head, and vice versa.

9.6.2 Recording

Luminance

The input signal (1-scart: pin 38 = scart , pin 36 = front end; 2-scart: pin 38 = input video selected using STV6401) is connected in the IC [7004] and is available uncontrolled on pin 32 as VREC (SECAM; VPS only unit data slicers). It reaches pin 31 via an electrolytic capacitor [2036]. In the IC [7004] the video signal first goes through an amplification control process (time constants determined by C [2035]). After the AGC the video signal reaches the FBC clamping stage (feed back clamp), then the video signal is divided onto 3 paths:

- **Loop-through signal path:** The video signal is amplified by 6dB following video entry and is available controlled on pin 29 as a VSB signal (OSD entry, data slicer -> I/O, front end,..).
- **Y-REC path:** The video signal passes via a 3.5 MHz low pass filter to vertical emphasis comprising the YNR block (part of this circuit block is used in REC for vertical emphasis) and a 1H-CCD delay line integrated into the SE IC [7004-C] and an external emitter follower [7006]. This vertical emphasis can be switched via IIC and is only active in LP. The Y-signal before the 1H-CCD can be measured on pins 43 and 45 on the IC [7004-C] (separated only by a coupling electrolytic capacitor). The Y-signal after the 1H-CCD is passed back from pin 46 IC [7004-C] via the E-follower [7006] on pin 41 IC [7004]. After the vertical emphasis the Y-signal passes via pin 21 [7004], the E-follower [7008] (the filter, on the base of the emitter follower is not active in REC mode (due to the low resistance of the output stage on pin 21 [7004]), via pin 21 [7004] and a clamping stage to the detail enhancer. The Y-signal is then passed to the non-linear emphasis, the linear emphasis (time constant via pin 18, 19 - due to the low resistance of the pin 18 output stage and the transistor [7010] introduced for impedance decoupling, the FM PB all-pass does not influence the linear emphasis) and the white/dark clipping stage. The signal generated in this way then triggers the FM modulator directly. The FM-Y-signal generated in this way is passed via the REC-EQ filter and the REC-FM-AGC1 to the Y-C

addition point. The FM-Y-signal can be measured after the REC-EQ filter on pin 12 [7004].
- **C-REC path:** see Chrominance PAL Recording (6.2.2).

Chrominance PAL

The chroma signal is separated from the video signal after the FBC clamping stage (see “Luminance recording“) by the BPF1 band pass filter and reaches the ACC stage via a delay element (D.E.) and a low pass filter (LPF). The ACC amplifier stage controls the chroma amplitude for the subsequent stages (time constant via capacitor [2038] on pin 14 [7004]). The chroma signal is then conveyed to the main converter (Main Conv.). The main converter mixes the 5.06MHz subcarrier with the 4.43 MHz chroma signal to the 627kHz chroma FM signal. The subcarrier is a mixture of 4.43MHz (the REC APC time constant on pin 65 compares quartz and burst frequency) and (40+ 1/8) fH = 627kHz (produced by 321fH -VCO corresponds to 8(40+1/8)fH, time constant pin 60/62 and phase rotation in accordance with the VHS standard, 10 [7004] (CROT)). Via a low pass filter (C_LPF) and the colour killer stage (KIL), the converted chroma signal reaches pin 72 on the IC [7004], where it is added directly to the Y FM signal IC internally via a capacitor [2007]. The colour killer can either identify the incoming signal itself (PAL yes/no, PAL: chroma signal out, SECAM L: chroma signal killed) or be set via the I^2C bus to PAL MESECAM or SECAM L. The quartz oscillation (pin 66) is used for chroma processing, in addition to the reference frequency, and also for generating the pulse frequency for the combined CCD on pin 49 integrated into the IC [7004].

MESECAM

The signal path is virtually identical to the path for PAL.

The differences are:
- No phase rotation.
- The filter characteristic for the chroma band passes becomes wider.
- Free-running quartz frequency

SECAM L

The video signal (VREC) from the SE IC pin 32 [7004] passes through SECAM L SE IC pin 15 [7072] and a band pass filter (4.3MHz BPF-A) and reaches the cloche filter (CA filter components pin 21) which reverses the Hf pre-emphasis on the sender side. The C-signal is then limited (LIM, time constant pin 18) and divided to 1/4 of the frequency in the frequency divider. The C-signal is suppressed in SYNC GATE during the H-sync. period. The harmonics arising in the division into four and the gating are suppressed in the band pass filter (1.1MHz BPF) and then pre-processed in the anti-cloche filter (filter components pin 8) for standard VHS recording. The amplitude on the REC-chrome signal on pin 11 [7072] can be set using the setting resistor [3088] on pin 10 [7072]. This REC-chroma signal is passed via transistor [7077] as a CSRP signal to SE IC pin 72 [7004] following an external drop (3.9MHz, suppression of the 3rd harmonics of the low frequency REC-chroma) and added to the FM-Y-signal in the SE IC.
As the SECAM SE IC (LA7339A) has an automatic cloche and anti cloche comparison, only the REC-chroma signal level is required to be set.

FM signal

After the addition of the FM-Y-signal and the C-signal, this FM-signal is adjusted by the REC-FM-AGC2 controlled by the IIC bus to the preset amplitude (reference: pin 74 [7004] resistor [3009]). The head pair is selected using the HSC control line.

9.6.3 Playback

FM signal

The FM signal coming from the scanner is amplified by approx. 60dB. Depending on the level of the HSC and HP1 line, the amplified FM signal is connected to pin 74 [7004]. The envelope curve signal for the head currently active (TRIV) is output on pin 93 [7004]. In addition, the envelope curves for the SP and the LP heads which read from the tape are compared and output as the ENVC signal.
The FM signal (FMPV) on pin 74 [7004] is used internally for Y, SECAM, MESECAM and NTSC M/N playback and externally for SECAM playback.

Luminance

The FM playback signal is first adjusted in the AGC stage to a constant level and filtered in the FM processing (PB-EQ). The signal exits the IC [7004] on pin 18, passes via an E-follower [7010] with drop (1.07MHz - only in SECAM units - to suppress additional chroma remainders externally) to a phase shifter [7003] and enters the IC once more on pin 17 [7004]. The FM-Y signal limited using the double limiter is demodulated (FM-DEM) and filtered using a low pass (SUB_LPF). The demodulated Y signal is also affected by the recording-side pre-emphasis. This now removes the linear de-emphasis at the base of the emitter follower [7008]. The filter circuit is effective, as pin 21 [7004] becomes an open collector output in playback mode, where the load impedance is determined by the de-emphasis circuit.
The Y signal is then clamped after the E-follower on pin 20 [7004], filtered using a low pass, and carried by a vertical noise canceller or dropout compensator (Y.N.R.). To do this the Y-signal exits the IC [7004] (out: pin 43, in: pin 41) and delayed by 1H in the internal CCD. The CCD-1H delay line is effective for the Y signal first as a comb filter (vertical noise suppression) and secondly as a line storage device for the dropout compensation. The subsequent switching stages are: The non-linear de-emphasis (NON_LIN DE_EMP), horizontal noise canceller (N.C.1 / N.C.2) and the picture control switching to the increase in edge steepness (PIC_CTL ANR; sharpness). The luminance signal is then added to the chroma signal (Y/C MIX) and output (pin 29 [7004]) as FBAS signal via a clamp (FBC), the video input (CHARA INSERT) and a 6dB amplifier (6dB_AMO).

Chroma PAL

This is first adjusted in the AGC stage to a constant level and filtered in the FM processing (PB-EQ). The signal exits the IC on pin 18 [7004], and passes via an E-follower [7010] with drop (1.07MHz). On pin 17, the FMPV signal is carried from the head amplifier to the IC [7007] signal electronics.
From the FM playback signal the 627 kHz chroma signal is filtered using the internal low pass (C_LPF). The ACC amplifier amplifies and controls the chroma amplitude. In the main converter (MAIN CONV), the chroma signal is mixed with 5.06 MHz back to the original 4.43 MHz. The 5.06 MHz are produced in playback from the free-running quartz oscillator and from the (40+1/8) f_H = 627 kHz frequency derived from the 321fH-VCO. After the main converter the chroma signal is freed as far as possible from crosstalk from additional traces using a 2H comb filter (internal CCD connections: pin 57 -> 54; pin 59 -> 52 and pin 51 -> 61). The chroma signal is then filtered using a low pass (LPF), checked by the colour killer, filtered once again by a band pass, looped through pins 72 and 71 and then added to the Y signal.

Chroma MESECAM

The signal path is virtually identical to the path for PAL.

The differences are:
- No phase rotation.
- The comb filter is not active.

Chroma SECAM L
During playback the FM signal is passed from the band on pin 74 [7004] after the E-follower [7002] (FMPV) to pin 13 [7072], where the amplitude is adjusted in the AGC and passed via the same band pass (1.1MHz BPF) as for recording. The NF pre-emphasis for the recording is then reversed using a cloche filter (external filter components on pin 8; the same components as for recording). In the subsequent stages the frequency of the signal is doubled, filtered using a band pass (2.2MHz BPF) and doubled once again. Then follows another band pass (4.3MHz BPF-B), and then the limiter (LIM) already used for recording. The signal is then suppressed again during the H-sync. period and passed through a band pass filter (4.3MHz BPF-A; also used for recording). Before the SECAM-chroma signal exits the IC on pin 17 [7072], an Hf pre-emphasis is carried out once more (anti-cloche; external filter components on pin 21; the same components as for recording). After pin 17 there is a drop at 2.4MHz which suppresses the 2nd harmonic of the chroma from the band, a low pass filter which improves the harmonics of the high frequency chroma and a transistor [7073] which has an emitter connected to pin 72 (CSRP) on the SE IC [7004].

NTSC
During the playback of NTSC signals, the original NTSC chroma is converted into a PAL chroma signal. This requires an internal switchover in the IC in the chroma part:

The internal CCD is switched over on a 1H comb filter to reduce crosstalk.

The NAP switchover is activated and translates the 4.43MHz NTSC chroma signal into a PAL signal.

Line and picture frequencies remain unchanged in accordance with the NTSC standard.
The result is a 60Hz NTSC Y-signal with a 4.43MHz PAL C-signal.

PAL M,N
As for chroma PAL (6.3.3).

9.6.4 General

SECAM:
Automatic cloche and anti-cloche comparison: During the vertical blanking gap the external filter components (pin 21 or pin 8) on the cloche or anti-cloche are used to create an oscillator and to divide the resonance frequency produced, and compared with a frequency derived from the 4.43MHz oscillation (reference signal from the SE IC [7004]). Depending on the deviation, more or less internal capacity is connected in parallel to the external cloche and anti-cloche filter components. This process is carried out during each vertical blanking gap and thus also improves the temperature stability.

Chroma selection for REC and PB pin 71 and 72 SE IC [7004]:
Both the PB chroma and the REC chroma in PAL (MESECAM, PAL M/N) and also in SECAM are passed into the SE IC [7004] via pin 71 [7004]. In all PAL and MESECAM modes the DC voltage is on the base of the output emitter follower pin 72 [7004] 3.2V and the both bases of transistors [7077] and [7073] of the SECAM chroma signals are at 0V -> the PAL/MESECAM chroma signal is added to the FM-Y signal or to the PB-Y signal, according to REC or PB. In SECAM PB mode only the transistor [7073] has 2.5V DC voltage on the base. In SECAM REC mode only the transistor [7075] has 2.5V DC voltage on the base.

9.7 Audio linear (AL part)

9.7.1 Audio I/O for the 1-scart version

The input is selected via the IIC bus control in the IC signal electronics [7004-A]. Either signal AIN1 (pin 76) or AFV (pin 80) is selected. The output signal AMLP (pin 96) is passed to scart 1 and to the HF modulator.

9.7.2 Audio I/O for the 2-scart version

The input is selected via the IIC bus control in the IC signal electronics [7004-A]. Either signal AIN1 (pin 76), AINF_AIN2 (pin 78) or AFV (pin 80) is selected. The output signal AMLP (pin 96) is always passed to the HF modulator.

9.7.3 Audio linear recording

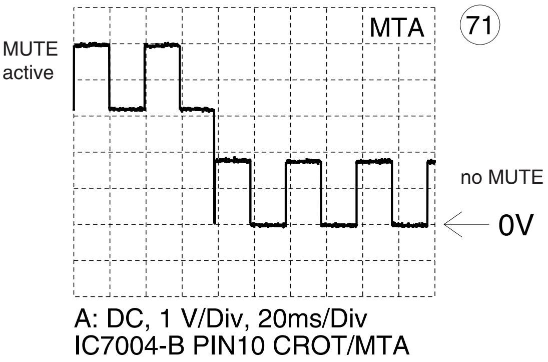
The signal inputs for recording or loop-through are pins 76,78 and 80 on the linear audio part of the IC LA71595 [7004-A]. During record and loop-through, the selected signal passes through the linear amplifier and then a mute stage and exits the IC on pin 96. This is the output which leads to the I/O part or the stereo units back to the AF part. The attenuation chain on pin 96 sets the required level for the ALC (Automatic Level Control) detector and the level for the recording amplifier. The time constant for the ALC detector is specified using R3605 and C2602 on pin 77. R3634, R3640, C2626 and C2627 create the frequency response for the recording amplifier. The output for the recording amplifier is pin 7. The recording current is then added to the bias current via resistor R3642 and flows via the audio head to pin 4 where an electronic switch is closed in the IC.
In long play mode the frequency characteristic is modified to the RC network R3635, R3641, C2630, C2631 for the recording amplifier.
The coil L5600 and the transistor T7608 create the erasing oscillator for the main eraser head and audio track eraser head, and generate the bias current for the audio head. The bias current is set using potentiometer 3625.
To prevent spikes, the erasing oscillator is switched on slowly. This is created using the switching stage T7603, C2609, R3611 and R3613.

9.7.4 Audio linear playback

During playback the switch [T7604, T7607] is controlled by pin 99 and is closed. The playback signal from the head is amplified in the equaliser stage (time constant between pin 1 and pin 3) and passed to pin 1. The resistor R3633 and the capacitor C2619 determine the head resonance during playback.
In long play mode the frequency characteristic is modified using R3627, C2617 for playback.
The output of the playback amplifier (pin 1) is passed via the filter R3632, C2623 to pin 100 where an electronic potentiometer sets the playback level via the 12C bus. Amplifier and head tolerances are compensated here. The amplification can be compensated via software control (12C bus) in service mode.

9.7.5 Audio linear muting

The mute stage in the linear audio part on the IC LA71595 [7004-A] is controlled by the combination control line MTA_CROT which is connected on pin 10 (VS part). The mute stage is activated in that the CROT control signal (square-wave pulse 1.7 Vss) is moved into the upper direct voltage range (> 2.2 V).



9.8 Audio HiFi - for stereo units (AF part)

9.8.1 General

All audio input and output selection switches, and the hi-fi FM audio signal processing, are located in the TDA9605 [7650]. This IC is controlled solely by the IIC bus. The carrier frequencies and band pass filter for the FM audio part are adjusted by the TDA9605 independently. This adjustment is started via the IIC bus following a mains reset. The RMHI signal is used as a reference for this [7650 Pin 41].

9.8.2 Audio I/O

The input and output selection switches are controlled exclusively by the IIC bus. Audio signals coming from the receiver part, the two scart sockets and the front sockets pass via pins 2 to 9 to the two input selector switches which select the relevant signals for the FM and the linear audio part. The output selector switch for SCART 1 and SCART 2 (pins 16,17 and 19, 20) select the relevant signal sources, independently from one another.
The RFAGC limits the maximum amplitude of the signal to the AMCO modulator (pin 13) to prevent overmodulation.

9.8.3 Audio HiFi recording

The signal coming from the input selector switch (INPUT SEL) reaches, via a level actuator (VOLUME L//R) and a low pass filter (LPF), the NOISE REDUCTION block, which compresses the dynamics during recording. The compressed signal is passed to both FM modulators (1.4MHz and 1.8MHz carrier frequencies). Both carriers are added and pass to the FM audio head amplifier. Via the recording / playback switch on the head amplifier, which is switched using the control line RMHI, the FM signal reaches the output (pin 35, pin 36, pin 37) on the FM audio processor and then the audio heads via the rotating transformer. The TRIA_ALM line forwards the size of both audio signals (1 VRMS = 2.68 VDC) to the AIO processor [7899-B]. This DC level information is required during recording by the SCART or front cinch socket to prevent overmodulation of the FM carriers. When the audio signal levels are too high, they are attenuated using the VOLUME controller via the I^{2}C bus.

9.8.4 Audio HiFi playback

The FM signal from the audio heads goes via the rotating transformer to the recording / playback switch (pin 35, pin 36, pin 37) on the head amplifier. After amplification in the head amplifier (66 dB), the FM signal reaches the HF-AGC (Automatic Gain Control), where the tolerances of the tape, the heads and the rotating transformer are balanced. Via the two band pass filter and limiters, the FM signals reach the PLL demodulators. Head change-over interference is suppressed using SAMPLE & HOLD stages (triggered by the RMHI signal). The demodulated signals are then expanded into the NOISE REDUCTION stage. The hi-fi signals are then available at the output selection switches. If there is no audio FM on the tape during playback, the output selector switch is switched over automatically from the IC to linear audio (input pin 22). In playback mode the TRIA_ALM line supplies the level of the FM envelope curve to the AIO processor [IC7899-B]. This level information from the FM envelope curve is used for the hi-fi tracking of the rotating FM audio heads to achieve the best possible playback quality (typically: 3.5 VDC).

9.8.5 Interface to the audio linear

In recording mode, the input selection switch NORMAL SEL in the TDA9605 [7650] selects the audio source for the linear audio part in the signal electronics IC LA71595 [7004 - A] and passes this signal to pin 21 (AMLR).
In stereo sets, the input selection switch on the signal electronics IC LA71595 [7004-A] is always set to IN2 (pin 78).
During playback the AMLP signal passes from the linear audio part in the signal electronics IC [7004-A] pin 96 to the linear audio input on pin 22 on the TDA9605 [7650].

9.9 IN/OUT (IO part)

9.9.1 Video

The entire video-I/O is carried out in 2-scart units using the matrix switch STV6401 [7904], which is controlled by the AIO via the IIC bus (SDA,SCL). To do this, the following signals are connected to STV6401 at the inputs: VFV-pin4, VIN1-pin6, VIN2-pin8, VOUT$^{1)}$-pin10 ($^{1)}$The VOUT signal is also passed through a voltage divider and a low pass [2906,3934,3928] and passed to the modulator where necessary via the emitter follower [7909]) and VFR-pin12 (front cinch input). The outputs OUT3/pin15 (scart 2) and OUT2/pin16 (scart 1) in the IC are fitted with a 6dB amplifier and convey the signal to the relevant scart socket. OUT1/pin2 has no amplifier; this signal (VBS) is passed on to the VS circuit parts for further processing:
In 1-scart units the SE IC [7004] selects the input video. SE IC original layout: VIN1 (the VBS line is used in the plan) pin 38 , VFV pin 36. The VOUT1 signal (scart 1 video out) is generated using an E-follower [7908] from the VOUT signal.

Audio for the 2-scart version:
The output signal for scart 1 is selected using the switch - IC HEF4053 [7911-C] using the MON control line (pin 9) from AMLP (pin 5) and AINF_AIN2 (pin 3). The output signal for scart 2 is selected using the switch - IC HEF4053 [7911-B] using the DEC control line (pin 10) from AIN1 (pin 2) and AFV (pin 1).

9.9.2 Decoder mode: (REC or STOP)

Program position with decoder (front end)
The front end signal (VFV or AFV1/2) is passed to the decoder connected to Scart 2 and from there, goes back to the VCR via VIN2 or AIN2L/AIN2R .
External input with decoder (9.2.2) is not possible for these program positions.

External input with decoder
The signal from scart 1-in (normally TV set) is passed to the decoder connected to scart 2. For scrambled programs, the decoder switches the pin 8 to high. The VCR then passes the decoded signal from scart 2-in to scart 1-out.

9.10 Follow Me (FOME part)

This circuit is used to compare the front end video with the video on scart 1 (video from the TV connected) in order to be able to save the stations in the same order as on the TV. The video signals from the front end (VFV) and from the scart socket (VIN1) are “digitised” using filters and comparators [7530-C, 7530-D] and compared with one another [7531, 7532, 7530-A]. Low on the output for the circuit means that the picture contents for the two video signals are identical and that both receiver parts (TV and VCR) therefore have to be adjusted for the same station. Possible errors detected may result with similar signals, e.g. news programmes.

9.11 VPS/PDC, on-screen display (VPO part)

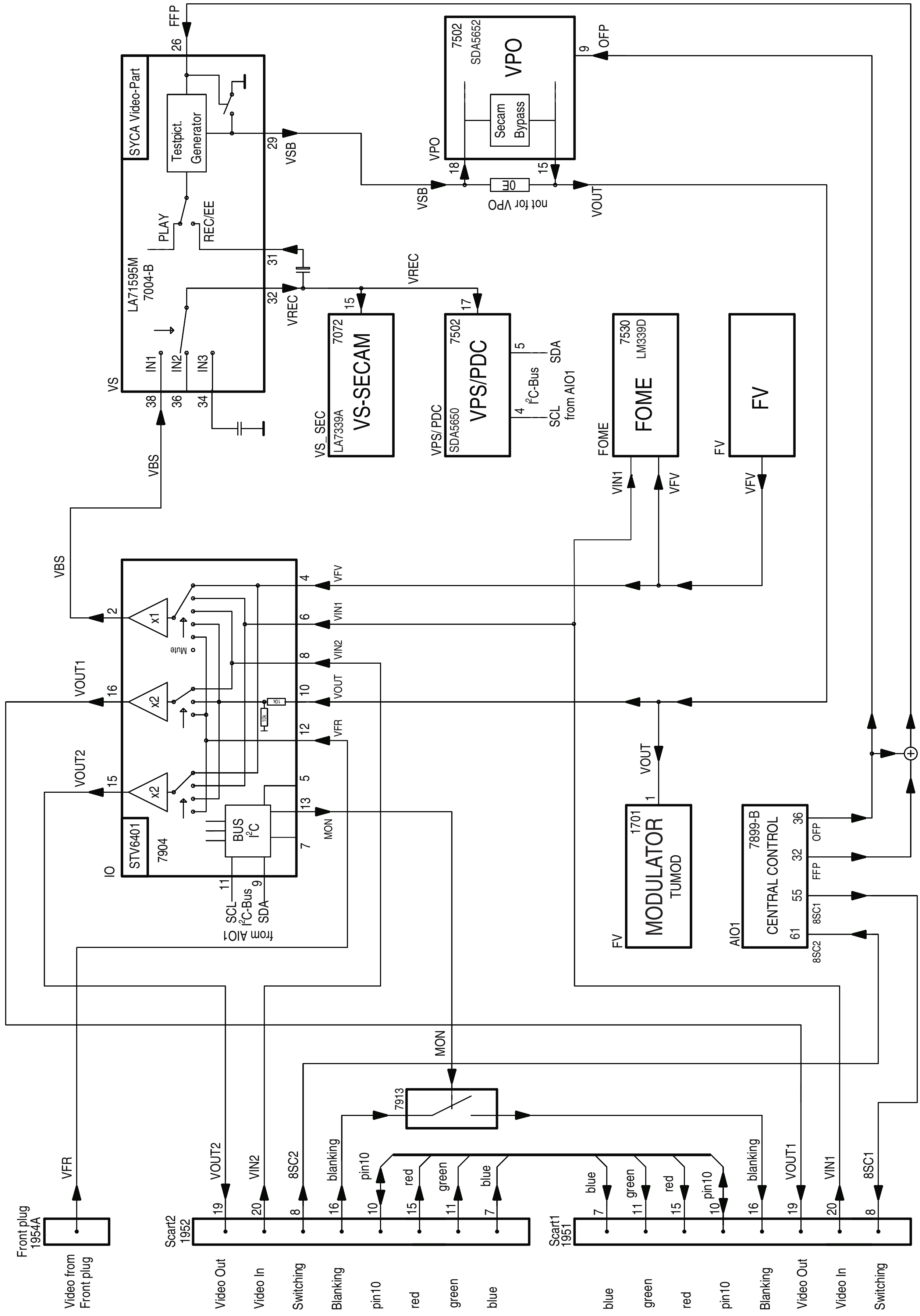
9.11.1 VPS/PDC

The VPS and PDC data is either decoded by the VPS-PDC decoder-IC SDA5650 [7502] or by the OSD-IC with integrated VPS, PDC decoder SDA5652 [7502]. Both ICs are compatible in terms of pins, despite any differences in the peripherals.
The VPS-PDC data are read from the vertical blanking gap and stored in the internal RAM. This data is read from the P via the I^2C bus.
The time can also be read from the TXT header line (required for “Time download“). The date is not called up from the TXT header (various write versions of the preset stations) but only via PDC format-1.
In the case of the SDA5650 [7502] the input video signal comes from the signal electronics IC LA71595M [7004-B pin 32] (VREC) via a 470n capacitor [2504] to the data slicer input on the SDA5650 (pin 17). For the SDA5652 the input signal from pin 29 (VSB) on the LA71595M [7004-B] comes via an emitter follower [7501] with a voltage divider to the data slicer input on the SDA5652 (pin1 17).

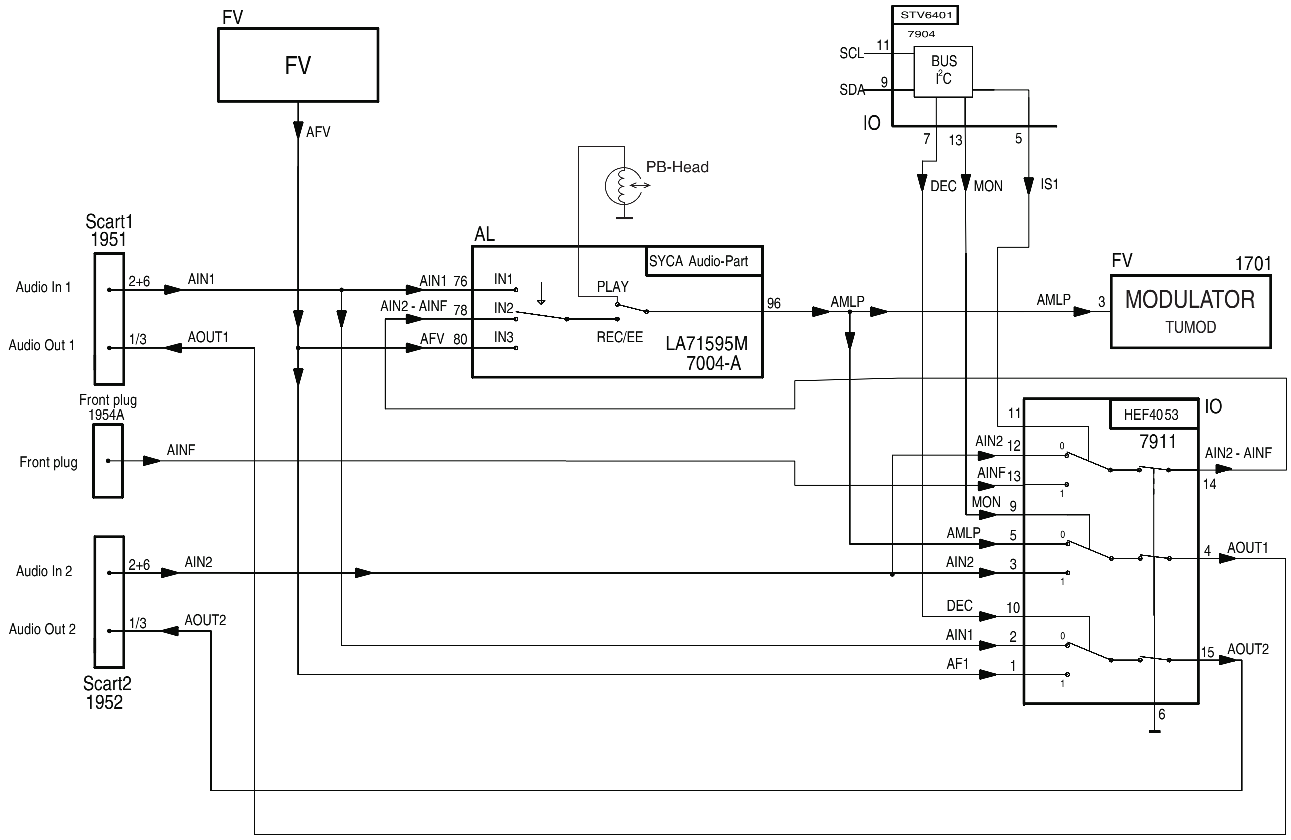
9.11.2 OSD-PART

The IC SDA5652 [7502] also allows both the generation of text keyboard matrices into a video signal and the generation of an entire picture (full page) for menu-control or if no background video is available.
The video signal (VSB) passes from the signal electronics IC LA71595M [7004-B pin 29] via a resistor [3512] to the input for the OSD-IC [7502 pin 18]. For keyboard matrices in Secam video signals, a bypass between video-in and video-out is activated via a switch inside the IC and a band filter [2507, 5502]. The output signal is available on pin 15.
A multiple of the doubled colour subcarrier oscillation from the signal electronics (2FSC/8.86MHz) is used as the system pulse for the IC. It is also used as a reference for generating the various OSD colours. The signal reaches the IC via a coupling capacitor [2509].
For the vertical synchronisation of keyboard matrices, an OSD frame pulse (OFP) is generated by the P [7899-B pin 36] and passed to the IC [7502] on pin 9. The horizontal sync-pulse is generated using an internal sync-separator and an internal H-PLL from the video signal on pin 17.
During full-page OSD (menu or no video) neither a vertical-sync (OFP) nor an H-sync is required, as in this mode, the OSD-IC generates everything from the system clock frequency, i.e. all the necessary pulses are generated internally from the 2FSC signal.

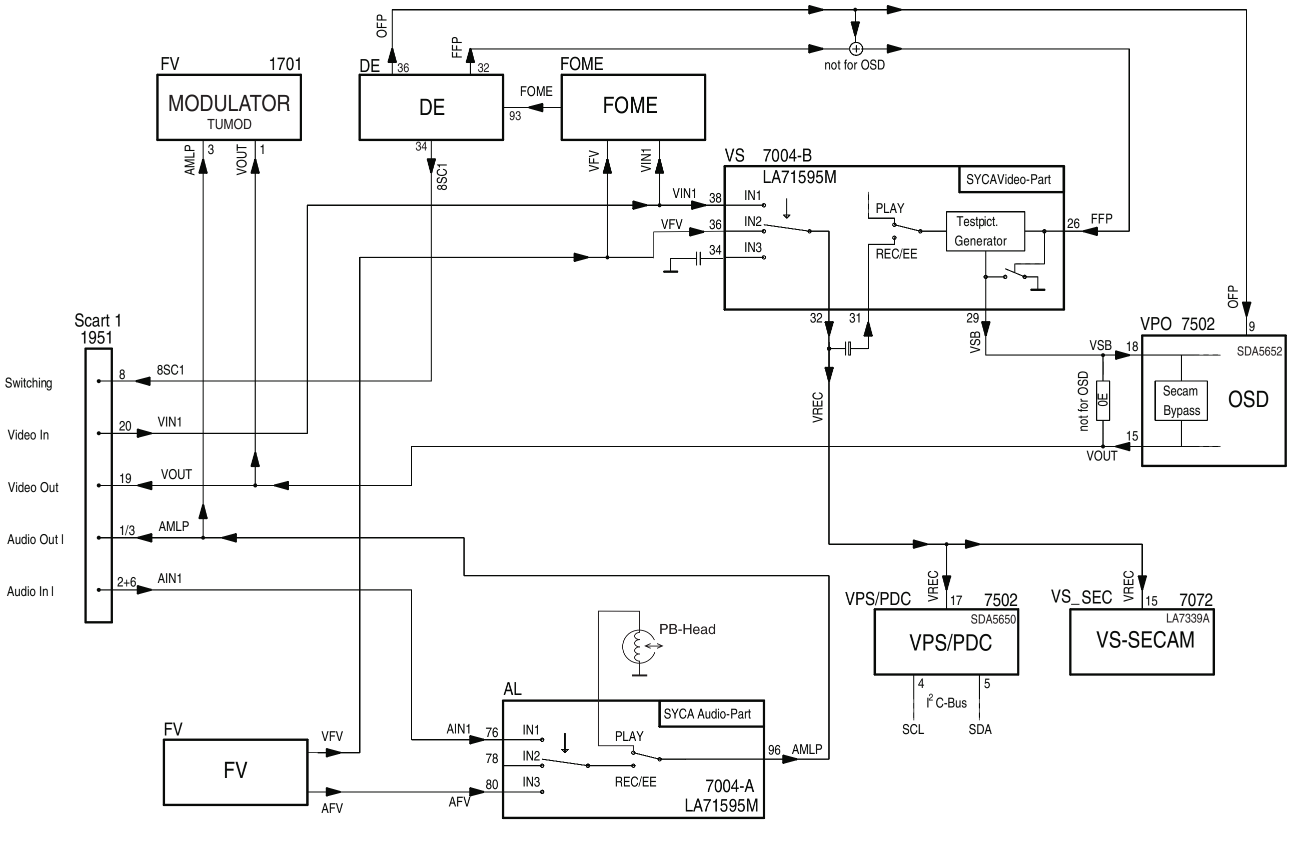
9.12 Simple Blockdiagram


SYCA Video-Part
LA71595M
7004-B
VS
Testpict. Generator
PLAY
REC/EE
IN1
IN2
IN3
38
36
34
26
FFP
29
VSB
31
32
VREC
VBS
VS-SECAM
VS_SEC
LA7339A
7072
15
VPS/PDC
SDA5650
7502
17
5
4
SDA
SCL
I²C-Bus
from AIO1
VPO
7502
SDA5652
Secam Bypass
18
15
9
OFP
not for VPO
0E
VOUT
FOME
7530
LM339D
VIN1
VFV
FV
STV6401
7904
IO
x1
x2
x2
Mute
BUS I²C
2
16
15
4
6
8
10
12
5
13
7
11
9
VOUT1
VOUT2
VIN2
VFR
MON
10K
SCL
I²C-Bus
SDA
from AIO1
MODULATOR
TUMOD
1701
1
CENTRAL CONTROL
7899-B
AIO1
36
32
55
61
8SC1
8SC2
not for OSD
7913
Front plug
1954A
Video from Front plug
Scart2
1952
Scart1
1951
19
20
8
16
10
15
11
7
blanking
pin10
red
green
blue
Video Out
Video In
Switching
Blanking

IO-Block diagram 2 Scart-Video-Mono&Stereo

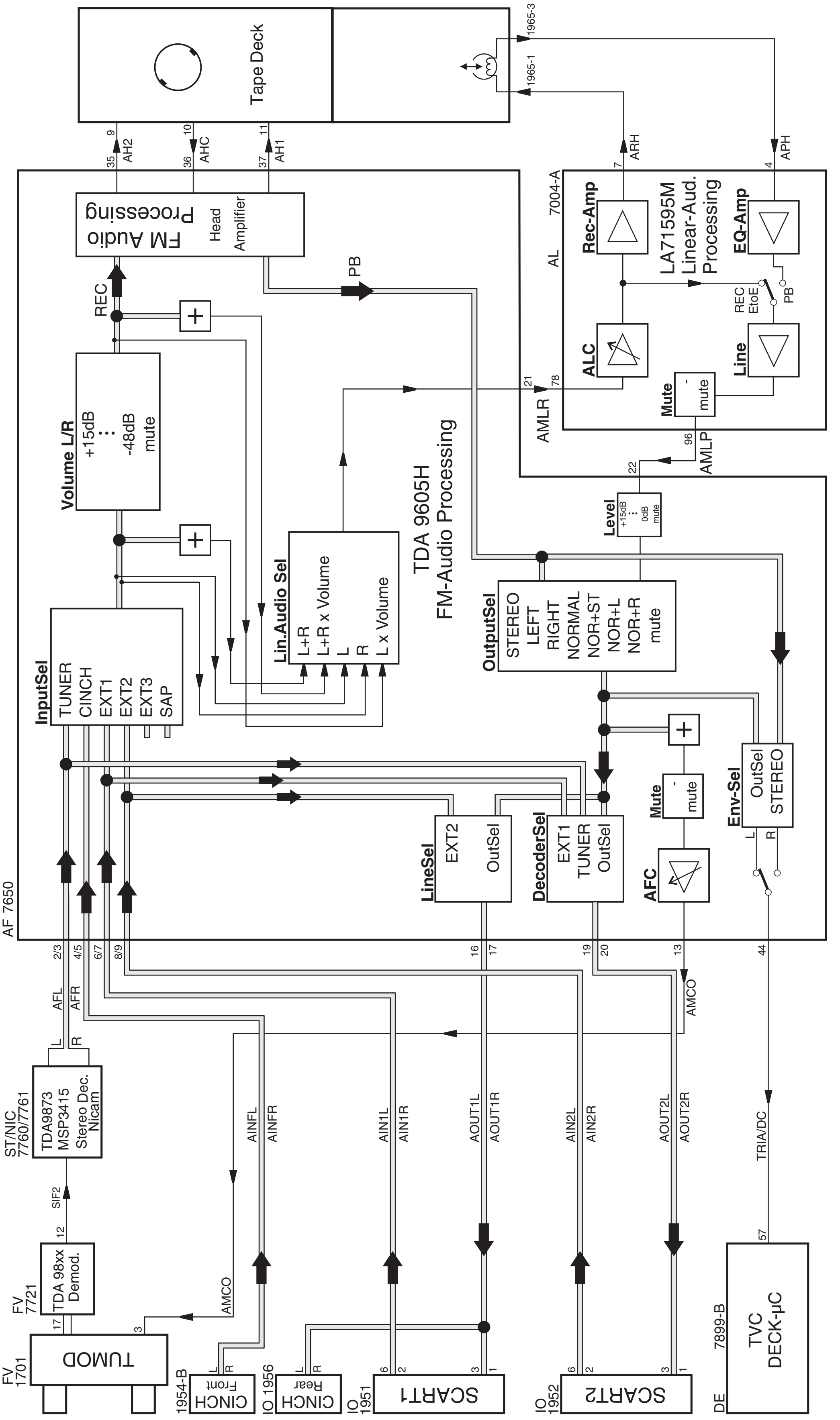

FV
FV
AFV
STV6401
7904
SCL
11
SDA
9
BUS
I²C
IO
7
13
5
DEC
MON
IS1
PB-Head
Scart1
1951
AL
SYCA Audio-Part
Audio In 1
2+6
AIN1
AIN1 76
IN1
PLAY
Audio Out 1
1/3
AOUT1
AIN2 - AINF 78
IN2
96
AMLP
AMLP
3
FV
1701
MODULATOR
TUMOD
AFV 80
IN3
REC/EE
LA71595M
7004-A
Front plug
1954A
Front plug
AINF
11
HEF4053
IO
7911
AIN2 12
AINF 13
MON 9
AMLP 5
AIN2 3
DEC 10
AIN1 2
AF1 1
AIN2 - AINF
14
4
AOUT1
15
AOUT2
6
Audio In 2
2+6
AIN2
Audio Out 2
1/3
AOUT2
Scart2
1952

IO-Block diagram 2 Scart-Audio-Mono


OFP
FFP
not for OSD
FV
1701
MODULATOR
TUMOD
AMLP
3
VOUT
1
DE
36
32
DE
34
8SC1
FOME
93
FOME
FOME
VFV
VIN1
VS 7004-B
LA71595M
SYCAVideo-Part
VIN1 38
IN1
VFV 36
IN2
34
IN3
PLAY
REC/EE
Testpict. Generator
26
FFP
32
31
29
VSB
VREC
OFP
VPO 7502
9
VSB 18
SDA5652
Secam Bypass
OSD
not for OSD
0E
15
VOUT
Scart 1
1951
Switching
8
8SC1
Video In
20
VIN1
Video Out
19
VOUT
Audio Out I
1/3
AMLP
Audio In I
2+6
AIN1
VREC
VPS/PDC
17
7502
SDA5650
VPS/PDC
4
5
I² C-Bus
SCL
SDA
VREC
VS_SEC
15
7072
LA7339A
VS-SECAM
PB-Head
AL
SYCA Audio-Part
FV
FV
VFV
AIN1 76
IN1
PLAY
78
IN2
96
AMLP
80
IN3
REC/EE
7004-A
LA71595M
AFV
AFV

QMB1 IO-Block diagram 1 Scart-Audio-Video-Mono

9.13 Simple Blockdiagram FM Audio / Linear Audio processing


Tape Deck
1965-3
1965-1
35 AH2 9
36 AHC 10
37 AH1 11
7 ARH
4 APH
FM Audio Processing
Head Amplifier
REC
PB
Volume L/R
+15dB
-48dB
mute
InputSel
TUNER
CINCH
EXT1
EXT2
EXT3
SAP
Lin.Audio Sel
L+R
L+R x Volume
L
R
L x Volume
TDA 9605H
FM-Audio Processing
OutputSel
STEREO
LEFT
RIGHT
NORMAL
NOR+ST
NOR+L
NOR+R
mute
Level
+15dB
0dB
mute
AL 7004-A
Rec-Amp
LA71595M
Linear-Aud.
Processing
EQ-Amp
REC
EtoE
PB
ALC
Line
Mute
mute
21 78 AMLR
22 96 AMLP
LineSel
EXT2
OutSel
DecoderSel
EXT1
TUNER
OutSel
Mute
mute
AFC
Env-Sel
OutSel
STEREO
L R
AF 7650
2/3 AFL
4/5 AFR
6/7
8/9
16 17
19 20
13 AMCO
44
ST/NIC 7760/7761
TDA9873
MSP3415
Stereo Dec.
Nicam
L R
SIF2
12
FV 7721
TDA 98xx
Demod.
17
FV 1701
TUMOD
3
AMCO
AINFL
AINFR
AIN1L
AIN1R
AOUT1L
AOUT1R
AIN2L
AIN2R
AOUT2L
AOUT2R
TRIA/DC
57
1954-B
CINCH Front
L R
IO 1956
CINCH Rear
L R
IO 1951
SCART1
6 2 3 1
IO 1952
SCART2
6 2 3 1
DE 7899-B
TVC
DECK-µC

9.14 List of abbreviations

Signal	Description	Application											
5V_1WSTBY	+5V analog in < 1W mode	PS	AIO1	AIO2	DE								FOME
5V_STBY	+5V analog in STDBY mode	PS		AIO2	DE				FV		VPO	IO	
5VA	+5V analog	PS				AF		FM	FV	VS	VPO		
5VD	+5V digital	PS	AIO1		DE								
5VS	+5V analog for power on reset stage				DE								
5VS1	+5V analog for head wheel position				DE								
7NEG	-7V I/O-switches supply											IO	
8SC1	Scart 1 pin 8 output		AIO1									IO	
8SC1L	Scart 1 pin 8 output low		AIO1									IO	
8SC1M	Scart 1 pin 8 output medium		AIO1									IO	
8SC2	Scart 2 pin 8 input		AIO1									IO	
9-14VM2	Capstan motor supply, switched	PS			DE								
9VA	+9V analog	PS				AF							
9VASW	+9V analog stereo	PS						FM				IO	
10SC12	Scart 1/2 pin 10 in/out P50		AIO1									IO	
14AL	+14V analog	PS					AL						
14VM1	+14V for threading- and headmotor	PS	AIO1		DE		AL					IO	
18VNEG	-18V display supply	PS		AIO2								IO	
33V	+33V for tuner tuning voltage	PS							FV				
2FSC	2 fold sub carrier frequency									VS	VPO		
AEH1	Audio erase head						AL						
AEH2	Audio erase head						AL						
AFC	Automatic frequency control		AIO1						FV				
AFL	Audio FM Stereo left					AF		FM					
AFR	Audio FM Stereo right					AF		FM					
AFV	Audio-Frontend						AL	FM	FV				
AGC	Automatic gain control		AIO1						FV				
AH1	AudioFM-Head-1					AF				VS			
AH2	AudioFM-Head-2					AF				VS			
AHC	AudioFM-Head-Common					AF				VS			
AIN1	Audio input scart 1						AL					IO	
AIN1L	Audio input scart 1 left					AF						IO	
AIN1R	Audio input scart 1 right					AF						IO	
AIN2L	Audio input scart 2 left					AF						IO	
AIN2R	Audio input scart 2 right					AF						IO	
AINF_AIN2	Audio input front/scart 2						AL					IO	
AINFL	Audio left from front connector					AF						IO	
AINFR	Audio right from front connector					AF						IO	
AMCO	Audio to the modulator					AF			FV				
AMLP	Audio mono playback					AF	AL		FV				
AMLR	Audio mono record					AF	AL						
AOUT1L	Audio output from scart 1, left					AF						IO	
AOUT1R	Audio output from scart 1, right					AF						IO	
AOUT2L	Audio output from scart 2, left					AF						IO	
AOUT2R	Audio output from scart 2, right					AF						IO	
APH	Audio playback head						AL						
ARH	Audio record head						AL						
BLANKING	Blanking pulse RGB loopthrough											IO	
BLUE	Blue signal between scart 1/2											IO	
CAP	Capstan control voltage		AIO1		DE								
CREV	Capstan reverse		AIO1		DE								
CSI	Colour system information		AIO1							VS			
CSRP	Chroma-SEC-Rec-Playback									VS			
CSW	8V/14V switching for capstan motor	PS	AIO1										

Signal	Description	Application											
CSYNC	Composite sync pulse		AIO1							VS			
CTL1	CTL-Synch-1				DE		AL						
CTL2	CTL-Synch-2				DE		AL						
DEC	Audio switching voltage AIN1/AFV											IO	
DECK_INIT	Init switch		AIO1										
DRUM	Head motor speed phase signal		AIO1		DE								
ENVC	Envelope comparator signal		AIO1							VS			
FFP	Feature frame pulse		AIO1							VS			
FGD	Capstan tacho pulse digital		AIO1		DE								
FMPV	FM video playback									VS			
FOME	Follow Me (video signals equal)		AIO1										FOME
FSC	Sub carrier frequency									VS			
FTA	Threading tacho				DE								
FTAD	Threading tacho digital		AIO1		DE								
GREEN	Green signal between scart1/2											IO	
GND	Ground	PS	AIO1		DE	AF						IO	
GNDAF	Ground on C650/651					AF							
GNDAIO	Ground on C601					AF	AL					IO	
GNDAL	Ground on C603						AL						
GNDAL1	Ground on C602						AL						
GNDD	Ground digital	PS	AIO1	AIO2									
GNDDE	Ground digital deck		AIO1		DE								
GNDEO	Ground on C601						AL						
GNDFMS	Ground FM							FM					
GNDFOME	Ground FOME on C530												FOME
GNDFV	Ground FV-ZF							FM	FV			IO	
GNDKEY	Ground key			AIO2									
GNDLED	Ground led	PS	AIO1										
GNDM1	Ground capstan motor	PS			DE								
GNDS	Ground for DE-CTL ampl.				DE								
GNDVIO	Ground video IO								FV	VS	VPO	IO	FOME
GNDVPO	Ground VPO on C500/501										VPO		
GNDVS	Ground VS on C602/603					AF	AL			VS			
GNDVARI	Ground front cinch											IO	
HEHI	Heater for displaytube high	PS		AIO2									
HELO	Heater for displaytube low	PS		AIO2									
HP1	Head-Puls-1		AIO1							VS			
HSC	Head switch puls SP / LP		AIO1							VS			
I1WSTBY	Inverse < 1W switch	PS	AIO1										
ILED	LED-tower supply		AIO1										
IPOR	Inverse power on reset		AIO1	AIO2	DE								
IREV	Erase oscillator on/off		AIO1				AL			VS			
IRR	IR receiver pulse		AIO1	AIO2									
IS1	Audio switching voltage AINF/AIN2											IO	
KEY_IN	Key matrix voltage		AIO1	AIO2									
KEY_LED	Key led front shuttle		AIO1										
LH1	Longplay-Head-1									VS			
LH1'	Longplay-Head-1'									VS			
LH2	Longplay-Head-2									VS			
LH2'	Longplay-Head-2'									VS			
MON	Blanking loop through scart 1/2											IO	
MOT1	Scanner motor 1 phase				DE								
MOT2	Scanner motor 2 phase				DE								
MOT3	Scanner motor 3 phase				DE								

Signal	Description	Application											
MTA_CROT	Audio mute / Colour rotation on/off		AIO1				AL			VS			
OFP	Frame pulse		AIO1								VPO		
PBH	PB-switch									VS			
PG_FG	Head wheel position/-speed		AIO1		DE								
PGIN	Scanner-Motor-Pulse				DE								
PSS	PAL or secam-L		AIO1						FV				
RECP	Record protection		AIO1										
RED/C	Red signal between scart 1/2											IO	
RMHI	REC-Mute/HeadPuls-Audio		AIO1			AF							
SATCO	Satelite control signal		AIO1										
SB1	Secam band 1		AIO1						FV				
SCL	IIC bus clock		AIO1	AIO2	DE	AF		FM	FV	VS	VPO	IO	
SDA	IIC bus data		AIO1	AIO2	DE	AF		FM	FV	VS	VPO	IO	
SDA-VS	IIC bus data filtered to VS									VS			
SFS	Sound filter switch		AIO1						FV				
SH1	Standard play-Head-1									VS			
SH1'	Standard play-Head-1'									VS			
SH2	Standard play-Head-2									VS			
SH2'	Standard play-Head-2'									VS			
SIF2	Sound-interfrequency							FM	FV				
STBY	Stand by switch	PS	AIO1	AIO2	DE								
SYNC	Control track pulse		AIO1		DE								
TAE	Tape end detection		AIO1										
TAS	Tape start detection		AIO1										
THIO	Threading motor in/out		AIO1		DE								
TMO	Threading motor on/off		AIO1		DE								
TRIA-ALM	Tracking audio / audio level indication		AIO1			AF							
TRIV	Tracking information video		AIO1							VS			
VBS	Video input									VS		IO	
VFV	Video from frontend								FV	VS		IO	FOME
VIN1	Video input scart 1											IO	FOME
VISS	Control sync pulse inversion		AIO1		DE								
VMOD	Video to the modulator								FV			IO	
VOUT	Video from OSD part										VPO	IO	
VREC	Video record from I/O									VS	VPO		
VSB	Video from signal electronics									VS	VPO		
W_R	Control track write/read		AIO1		DE								
WTL	Wind tacho left				DE								
WTLD	Wind tacho left digital		AIO1		DE								
WTR	Wind tacho right				DE								
WTRD	Wind tacho right digital		AIO1		DE								

PS	Power Supply	page 56
AIO2	Display Control	page 57
AIO1	Central Control	page 58
DE	Deck Electronics	page 59
FV	Frontend	page 61
FM	Audio Stereo Nicam	page 62
AL	Audio Linear	page 64
AF	Audio FM Processing	page 65
VS	Video Signal Processing	page 67
VPO	OSD, VPS/PDC	page 68
IO	In/Out	page 69
FOME	Follow me	page 70

10. Tape deck

10.1 Drive assembly

This tape deck has three motors; one providing precision drive for the scanner unit; the second providing direct drive for the capstan and belt drive for the reel tables; the third motor drives the lift and tape threading/dethreading operations.

Special features are:
- Quick start
- Short winding time
- Automatic cleaning of video heads by cleaning roller

To obtain a high repair standard we have developped a range of service kit's. These kit's covers the spare parts which are engaged together.
The tape deck's sensors are located on the motherboard underneath the tape deck, and included in its circuitry, lay out and parts list.

10.1.1 Deck parts replacement

The procedure for the removal and refitting of the following parts is described; only the lift, the scanner, the capstan motor and the A/C head are fixed by screws.
All the other deck assembly parts are held only by snap hooks.

For the replacement of parts on the underside of the tape deck, remove the tape deck from the motherboard.

Manual extraction of cassette:
If, after the Eject button has been pressed, the drive does not unthread and eject the cassette, the dethreading/eject operation can also be carried out manually by turning the wheel at the rear of the threading motor.

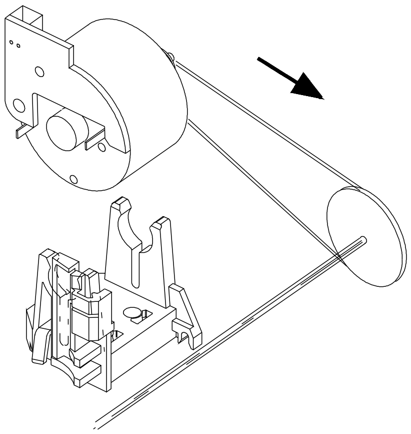
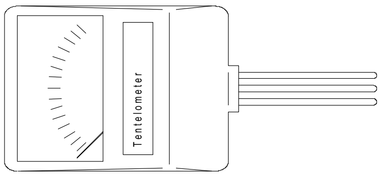


Figure 10-1

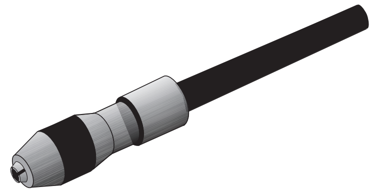
IMPORTANT:
After each repair has been carried out in the drive assembly, the first operation after repairing must be to bring the cassette compartment into „eject“ position by hand.

Auxiliary tools for deck adjustment:

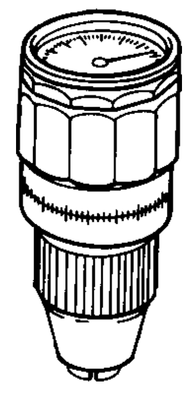


Tentelometer 4822 395 90584

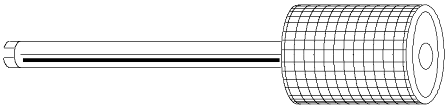
Tool for tapetension adjustment 4822 395 50188



Handle 4822 256 90493



Torquemeter:
600 gf-cm 4822 395 90232
90 gf-cm 4822 395 80196



Post adjustment screwdriver 4822 395 50275

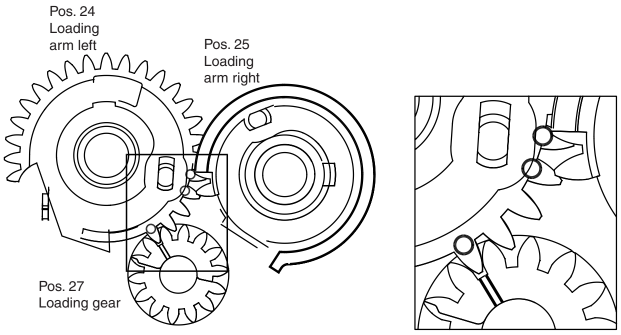
Testcassette 4822 397 30103
Nylon gloves 5322 395 94022

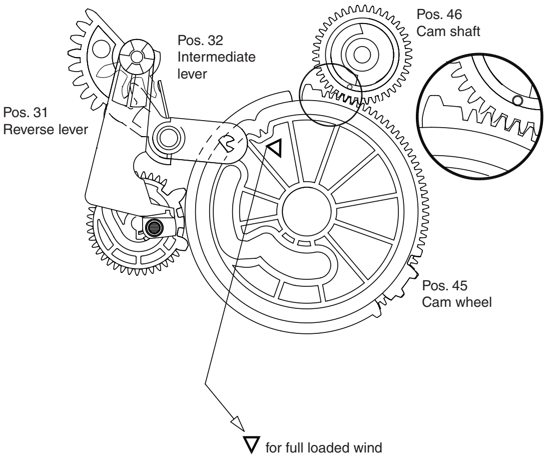
10.1.2 Deck layout diagram

Deck in position „threaded out“.

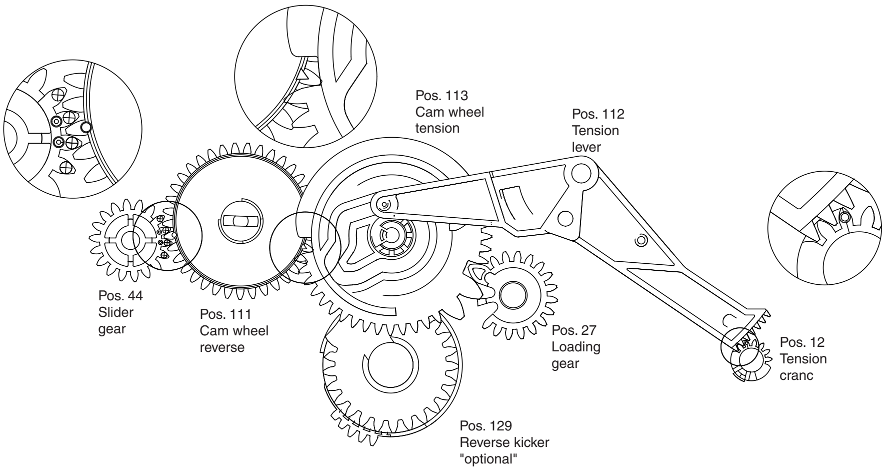
The following diagrams indicate the relative position of the gearwheels and levers when the deck is in the threaded out (cassette-compartment down) position.

Top view


Pos. 24
Loading
arm left
Pos. 25
Loading
arm right
Pos. 27
Loading gear


Pos. 32
Intermediate
lever
Pos. 46
Cam shaft
Pos. 31
Reverse lever
Pos. 45
Cam wheel
∇ for full loaded wind

Underside view


Pos. 113
Cam wheel
tension
Pos. 112
Tension
lever
Pos. 44
Slider
gear
Pos. 111
Cam wheel
reverse
Pos. 27
Loading
gear
Pos. 12
Tension
cranc
Pos. 129
Reverse kicker
"optional"

10.1.3 The lift

Refitting the lift compartment:
Ensure the lift compartment is down and gear A is rotated one click stop anticlockwise from the down position.
The removal and refitting of the lift can be carried out in all deck positions with the exception of „eject“ (ensure that gears 103/105 are free and if present the cassette loader gear 2 pos.105 is positioned to the rear).

To remove the lift:
Free the holding bracket (see figure 10-2) by rotating it up and back from the upper end.
Unscrew the 4 screws on the underside of the deck.
Carefully remove the lift vertically, noting the position of the record protect operating lever.

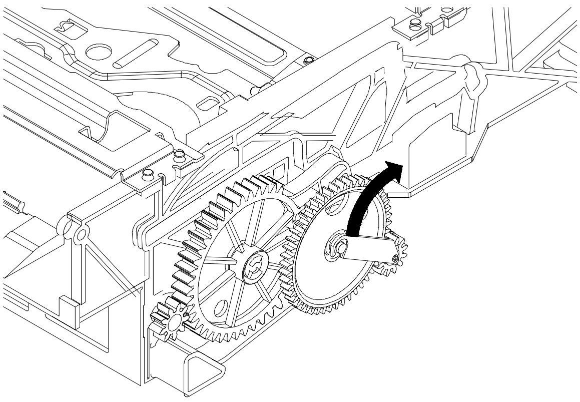


Figure 10-2

10.1.4 Scanner replacement

Removal:
Nylon gloves should be worn when handling the head disc.
Remove the deck from the set/mobo.
Unscrew the three scanner screws on the underside of the deck.
Pull out the scanner from the top. (see figure 10-3)

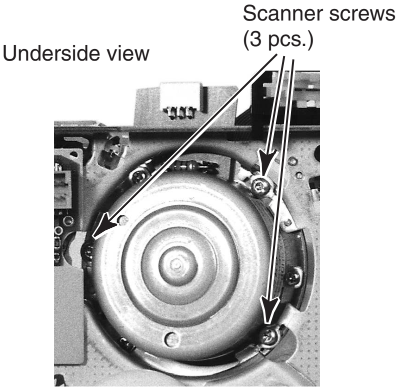


Figure 10-3

Installation:
Insert the scanner (with protective cover) carefully from top.
PCB and flex foil to the rear.
Be shure that the scanner is engaged to the referenc pin located on the chassis.
Turn the tape deck, holding the scanner in the deck by hand and fix it by use of the tree scanner screws.
Remove carefully the protective cover from top.

After replacing the scanner, carry out the following adjustments and checks:
Head switching puls.
Writing current adjustment.
Tape path alignment.
Check and adjust if necessary.

10.1.5 A/C Head (Combi head) (Pos. 36)

Remove the fixing spring (A) (see figure 10-4)
Remove the fixing screw and replace the A/C head.
Use a new fixing spring (included with new A/Chead) for reassembly.

After the A/C head has been replaced, all adjustments described in paragraph “A/C Combi head” and paragraph 10.2.2 have to be carried out.

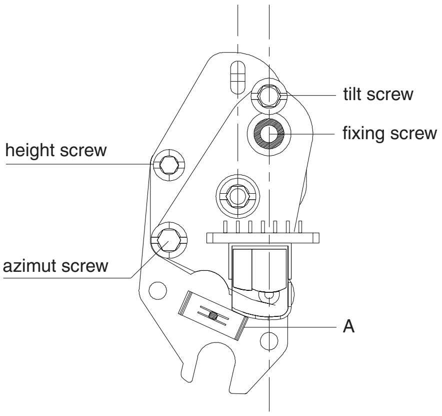


Figure 10-4

10.1.6 Threading motor (Pos. 38)

Remove the belt and disconnect the connector plug.
Remove the threading motor from the motor supports (see figure 10-5).

During reassembly ensure that the threading motor is correctly located in the front and rear supports.

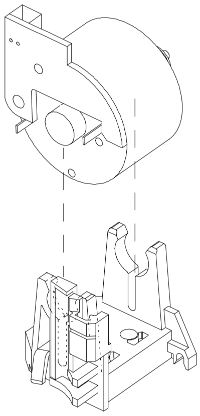


Figure 10-5

10.1.7 Capstan motor (Pos. 127)

Remove the tape deck.
Remove the belt (pos.126) on the underside;
Remove the three capstan motor fixing screws (see figure 10-6) and withdraw the capstan motor downward from the drive assy.
The reassembly is carried out in reverse order. Make sure that the capstan is free of grease.

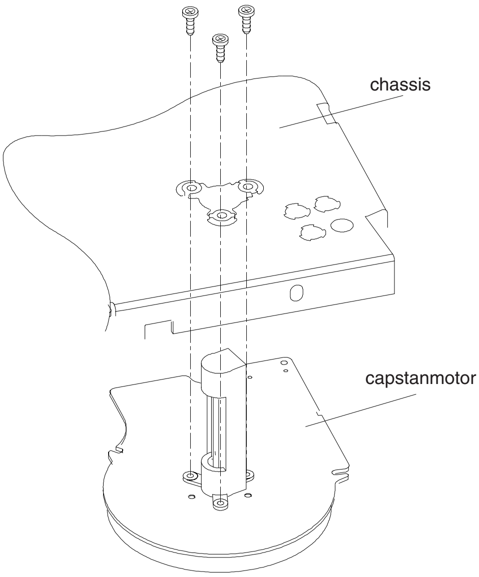


Figure 10-6

10.1.8 Pressure roller (Pos. 37)

Remove the tape deck
Unhook and remove the pressure roller tension spring.
Release the pressure roller guide (pos. 41) from the guide in the threading motor holder by pressing the top of the motor guide rearwards and rotating the pressure roller guide assembly clockwise by approximately a quarter of a turn (see figure 10-7). The pressure roller and guide can now be lifted clear.

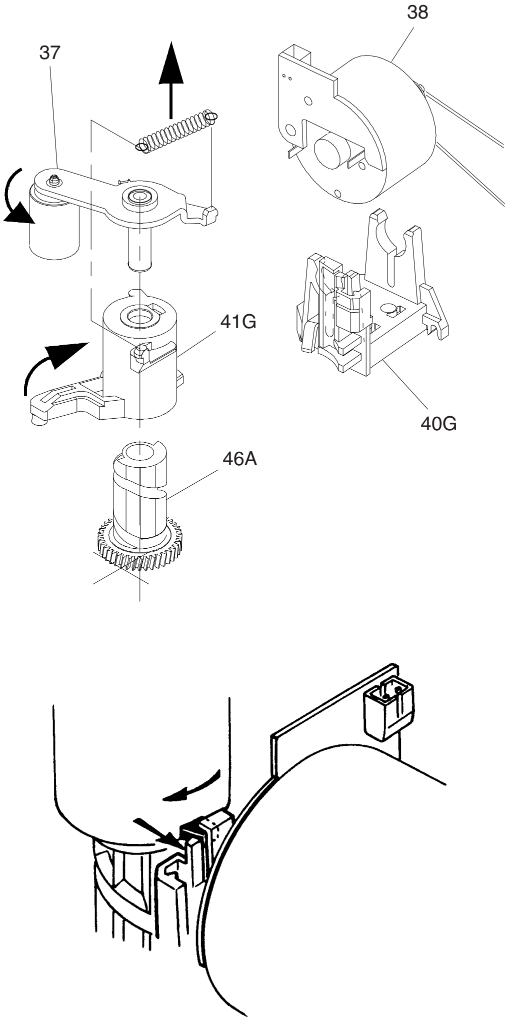


Figure 10-7

Ensure that no grease from the pressure roller guide gets to the capstan or pressure roller.
The reassembly is carried out in reverse order.

10.1.9 Roller unit right (Pos. 26)

Remove the tape deck.
Compress the two snap hooks by means of a pair of tweezers and remove the roller assy from the roller unit right (see figure 10-8).
Unhinge the loading arm right fromthe holding plate and push the latter towards the front of the deck to remove from the guide (right).

NOTE:
During reassembly ensure the link from 25 is engaged in the hole of the holder plate 26.
After replacing the roller unit (right), the tape path has to be checked, and adjusted if necessary.

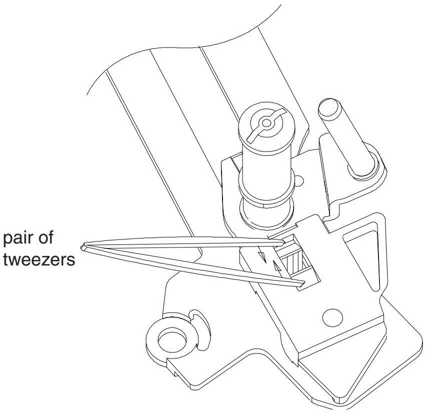


Figure 10-8

10.1.10 Roller unit left (Pos.23)

Set the drive assy to „Eject“ position.
Unhook the tension arm spring (pos. 11), to avoid the tension arm spring being pre-loaded.
At the bottom side of the drive assy remove the tension lever (pos.112).
Compress the two snap hooks by means of a pair of tweezers and remove the roller assy (A) from the plate (B).
Unhinge the loading arm (left) from the holding plate and remove the latter downward from the drive assy through the recess in the chassis (see figure 10-9).
The reassembly is carried out in reverse order.

NOTE :
During reassembly
1. Place the carriage holding plate in the assembly with the half-round cutout nearest the rear of the deck.
2. When the loading arm is refitted ensure the pin on the underside of 23 is through the link of 24B.

After replacing the roller unit (left) the tape path has to be checked (see division 10.2.1 Tape path), and adjusted if necessary.

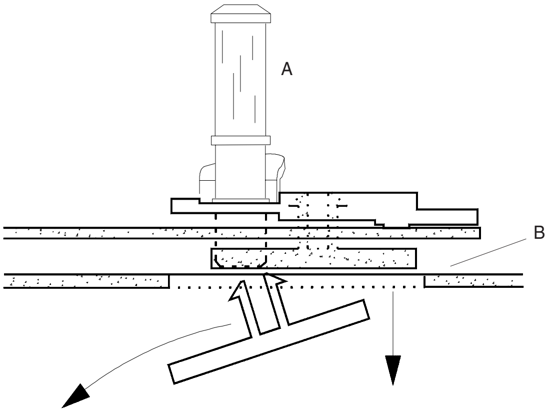


Figure 10-9

10.2 Adjustments

Adjustments must not be made in the service position.

10.2.1 Tape path

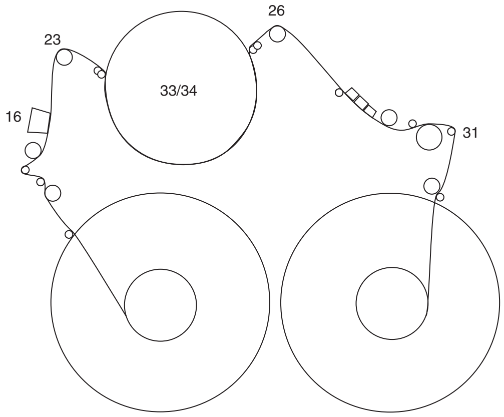


Figure 10-10

Roller left unit/roller unit right

Preparation:
Connect one input of a dual trace oscilloscope to observe the tape sync pulse CTL. The other input (DC coupled) to observe the tracking information TRIV.
Trigger the oscilloscope externally on the head pulse HP1 (“SWIN”).
Playback the black and white section of the alignment test tape.
Set the deck in the condition where the video heads are running along the upper edge of the tracks only by:

- Call the service test program (see chapter 5.1 Service test program)
- Activate manual tracking (service test program step 03) and watch the tape sync pulse move to the left in relation to the TRIV signal.
- Note the extreme left hand position reached by the sync pulse, repeat as necessary.
- Stop the movement of the pulse when the TRIV signal reduces to 1/2 to 2/3 maximum amplitude by pressing the normal play button. A noisy picture (disturbances) is visible on the TV set and the CTL pulse should be to the left of the display.

The recorder will hold this position until the service test progam step 03 is left.
This condition works only if X-distance is adjusted.

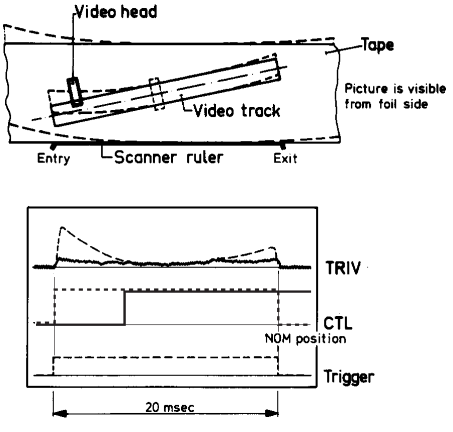


Figure 10-11

Adjustment:
Adjust the left and right roller units to make the tracking signal TRIV straight and flat as possible (Fig. 18).

A/C Combi head

Tilt angle adjustment
Set the drive to feature mode (e.g. +7)

Adjustment :
By means of the tilt angle adjusting screw move the tape until the lower edge just touches the tape guide A1 (see figure 10-12) the tape must not be distorted at the lower edge (by pressing onto guide).

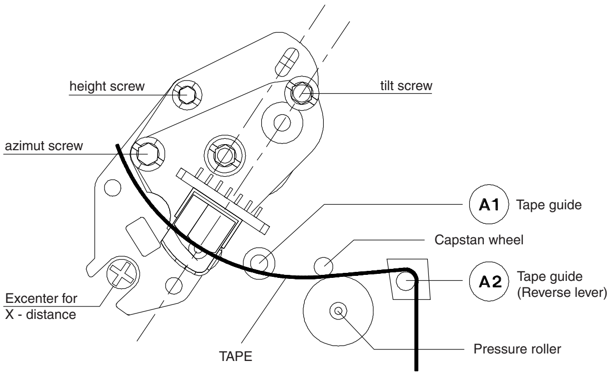


Figure 10-12

Adjustment of the azimuth angle and the head height:
Connect an oscilloscope to the linear Audio output.
Play the section of the test cassette with the audio signal 400 Hz.
Adjust for maximum output voltage by means of the height adjustment screw
Play the section of the test cassette with the audio signal 8 kHz.
Adjust to maximum output voltage by means of the azimuth adjustment screw (see figure 10-12).
If necessary, repeat this procedure
Check the tilt angle adjustment
If the tape path was completely out of adjustment or if several components in the tape path have been replaced, it is possible, that the adjustments described in paragraph “Roller left unit/roller unit right” and paragraph “A/C Combi head” have to be repeated several times.

10.2.2 Adjustment of the horizontal distance (x-distance)

Before this adjustment is carried out, insert the test cassette (start from Eject position). Call the service test program (tracking value will take up its nominal position) and press the „play“ button.
Playback the black/white part of the test cassette.)
Display the TRIV signal on an oscilloscope (DC-coupled) and adjust for maximum voltage by means of the excentric screw (see figure 10-12).

10.2.3 Brake band and tape tension

Due to further development it is no longer necessary to make theseadjustments after replacement of the brake band.
If the brake band or tape tension are completely misadjusted, set them to a center position; set the drive to „play“ and adjust the brake band until the edge of the elbow of the tape tension arm is aligned with the left inner edge of the left guide (see figure 10-13).

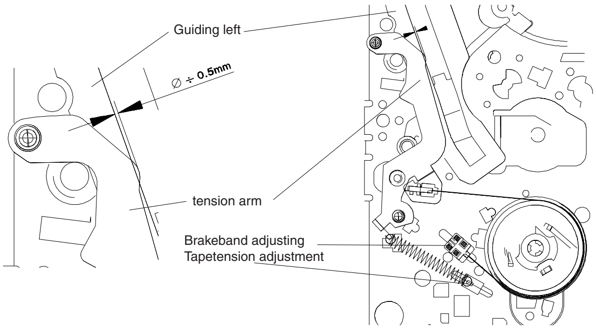


Figure 10-13

10.2.4 Friction clutch control check

Set the drive to „Play“ position.
Place the torquemeter on the right reel.
Turn the capstan motor to move the right reel clockwise.
Keep turning, until the indication at the torquemeter no longer changes (see figure 10-14).
The torque has to be 10,5 mNm +/-25% (105gFcm +/-25%)

10.2.5 Reverse brake control

Set the drive to „Reverse“ position.
Place a torquemeter on the right reel and turn the latter counterclockwise, until the reel just starts to flip.
The value indicated at the torquemeter has to be 7mNm +/-3mNm (70 gFcm +/-30gFcm) (see figure 10-14).

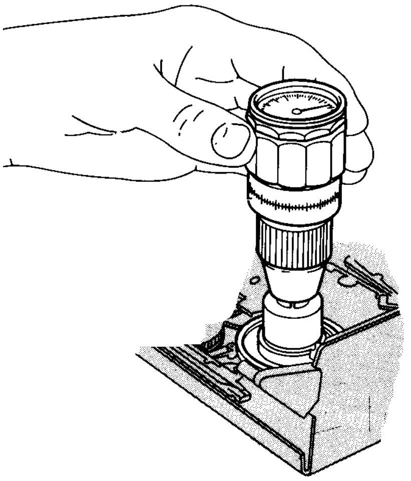
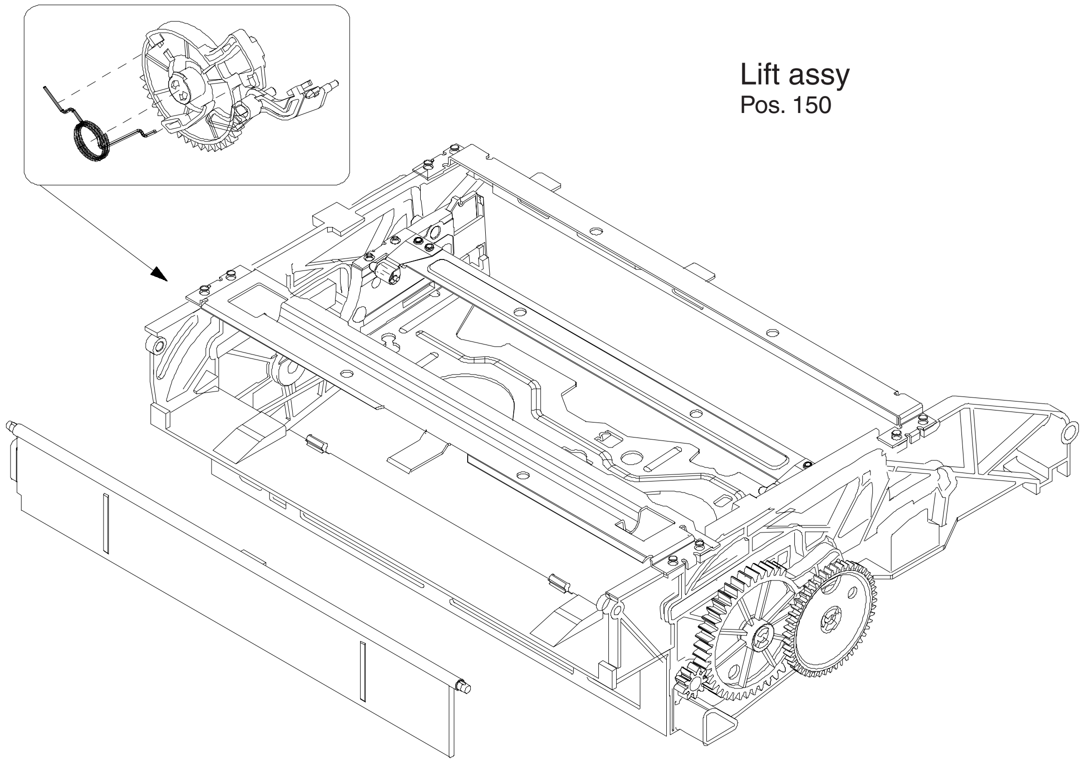
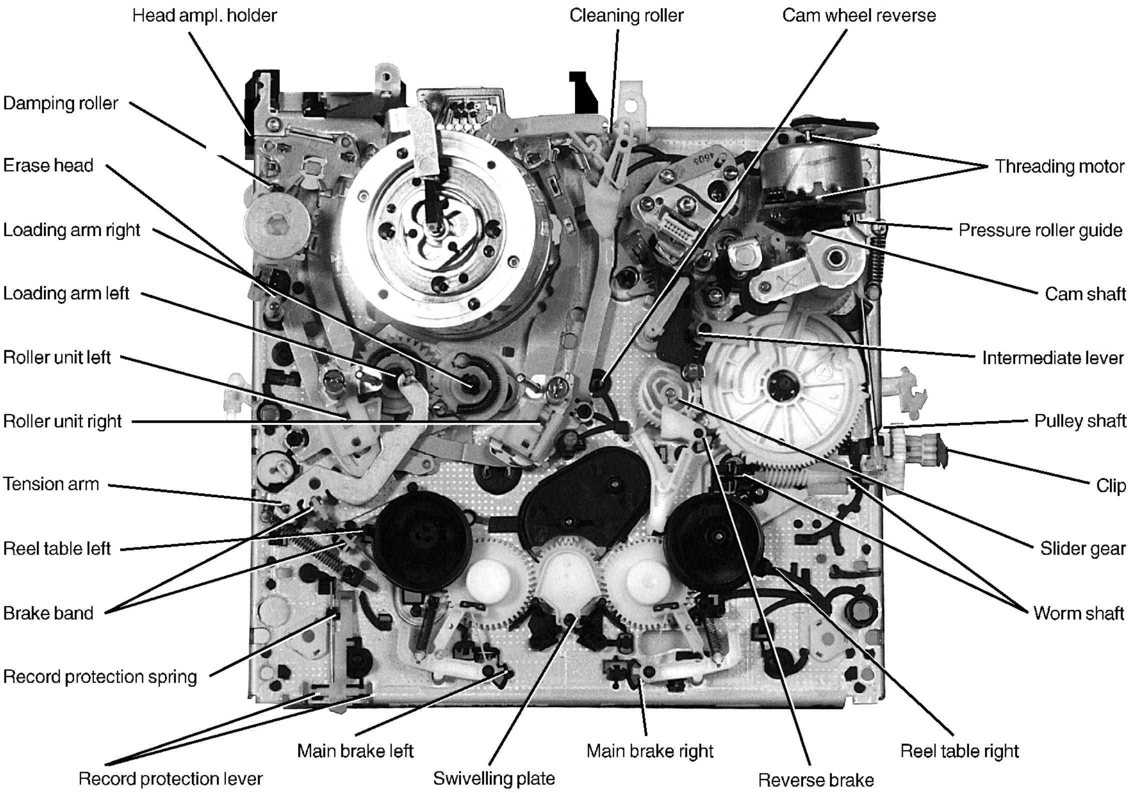


Figure 10-14

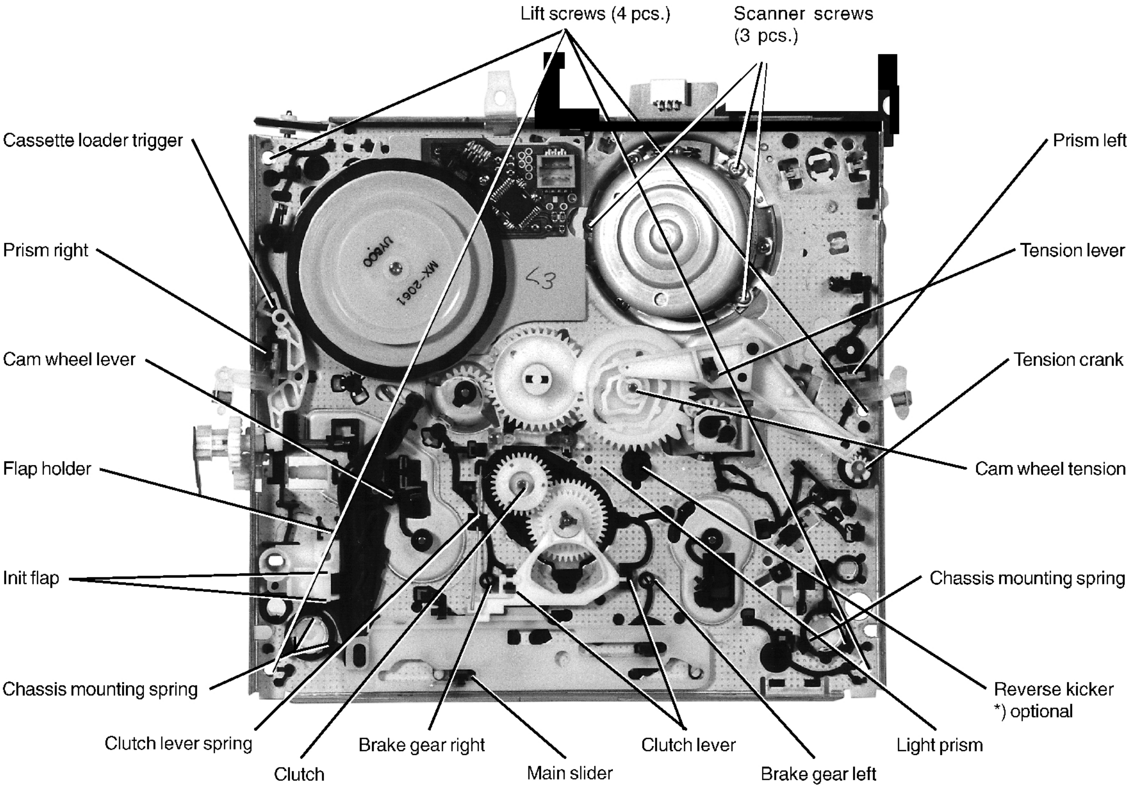


In order to make the replacement of the deck parts easier, the snap hooks are marked with an arrow.

TOP VIEW

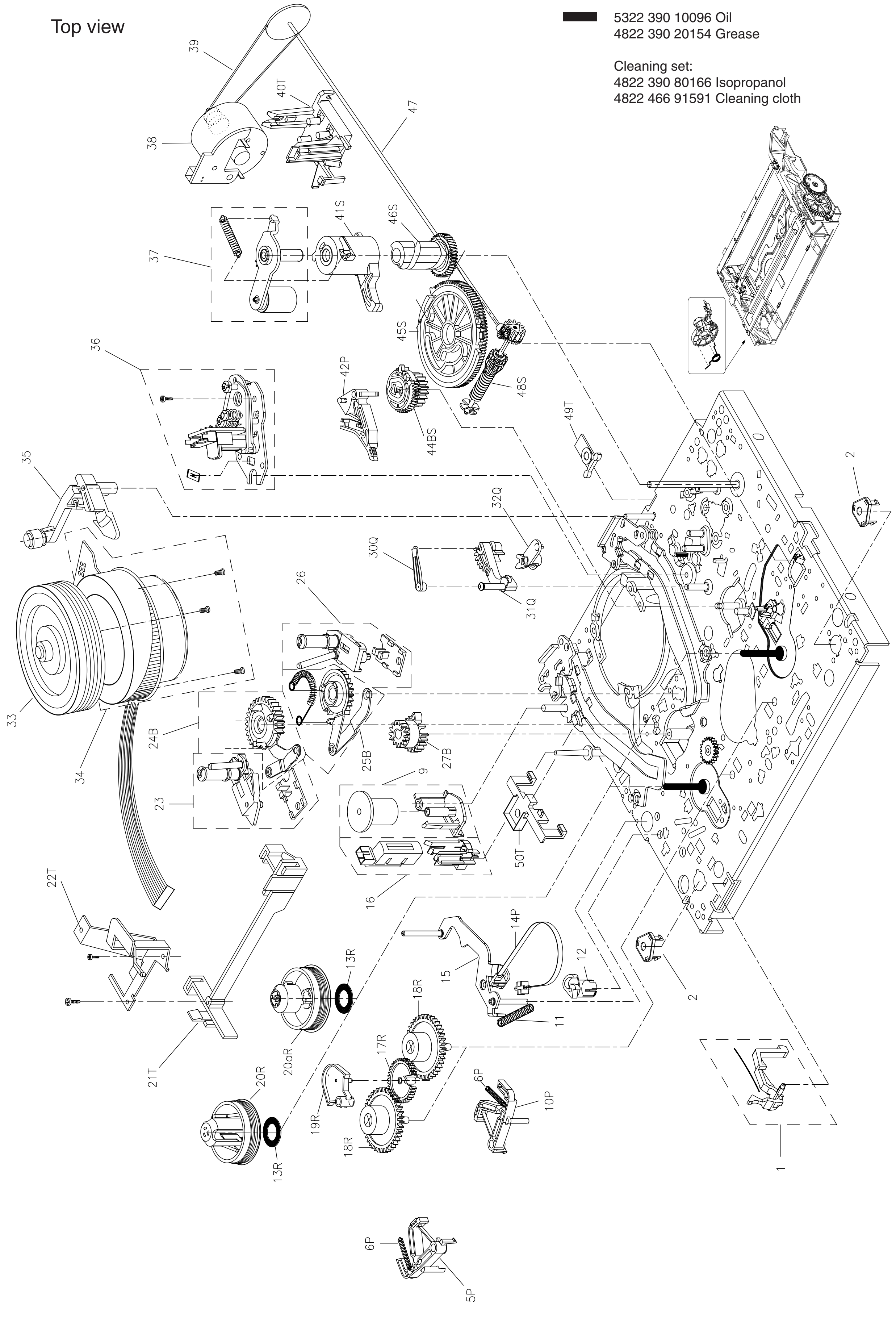

Head ampl. holder
Cleaning roller
Cam wheel reverse
Damping roller
Erase head
Loading arm right
Loading arm left
Roller unit left
Roller unit right
Tension arm
Reel table left
Brake band
Record protection spring
Record protection lever
Main brake left
Swivelling plate
Main brake right
Reverse brake
Reel table right
Threading motor
Pressure roller guide
Cam shaft
Intermediate lever
Pulley shaft
Clip
Slider gear
Worm shaft

UNDERSIDE VIEW


Lift screws (4 pcs.)
Scanner screws (3 pcs.)
Cassette loader trigger
Prism right
Cam wheel lever
Flap holder
Init flap
Chassis mounting spring
Clutch lever spring
Clutch
Brake gear right
Main slider
Clutch lever
Brake gear left
Light prism
Reverse kicker *) optional
Chassis mounting spring
Cam wheel tension
Tension crank
Tension lever
Prism left
UY600
MX-2061
43

10.3 DECK EXPLODED VIEW (TOP VIEW)

Top view

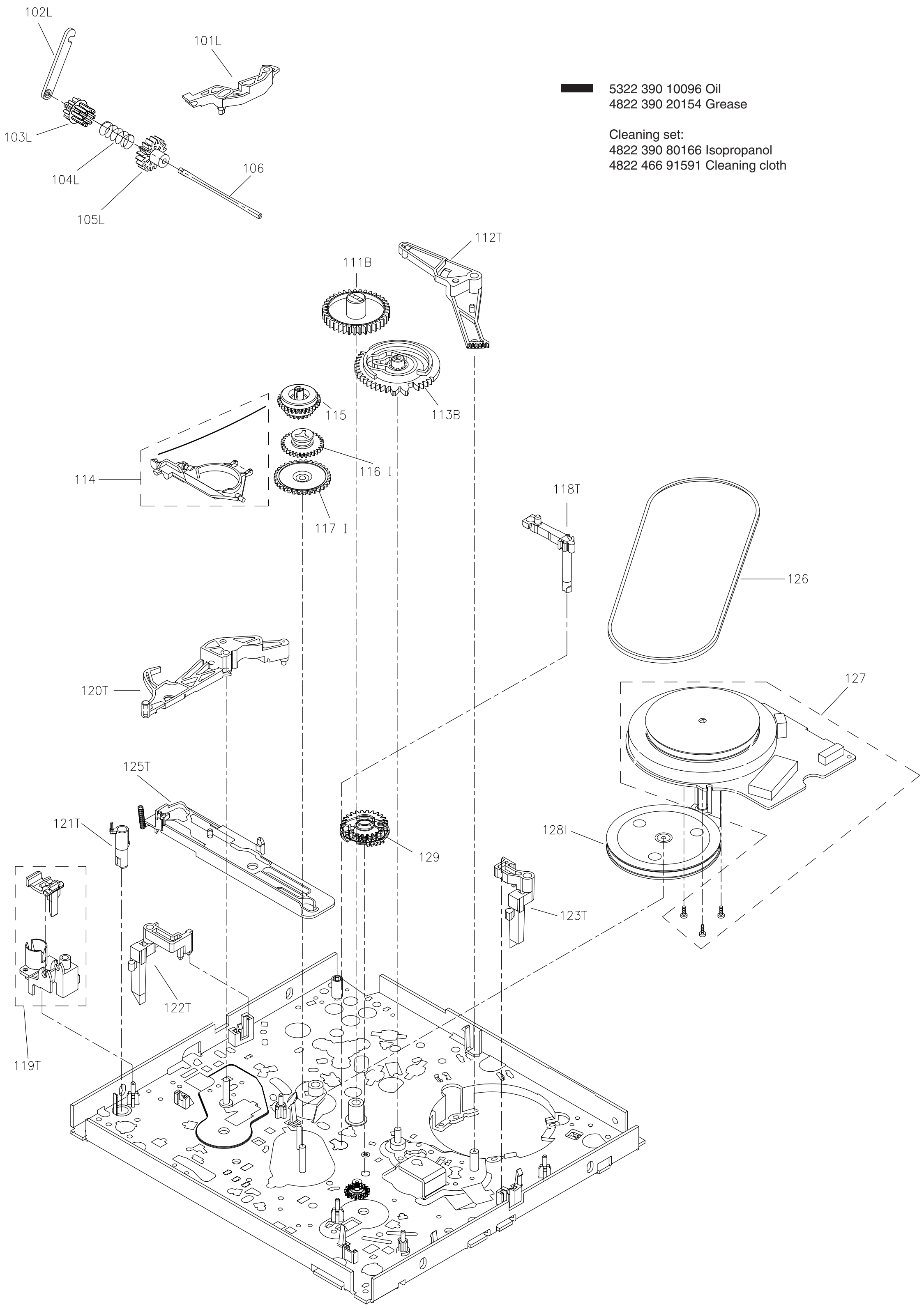

39
40T
47
38
37
41S
46S
45S
36
42P
48S
49T
44BS
35
32Q
30Q
2
26
31Q
33
24B
25B
27B
9
34
23
50T
22T
16
14P
13R
15
12
2
18R
11
20aR
17R
21T
20R
6P
10P
19R
18R
13R
1
6P
5P

▬ 5322 390 10096 Oil
4822 390 20154 Grease

Cleaning set:
4822 390 80166 Isopropanol
4822 466 91591 Cleaning cloth

10.4 DECK EXPLODED VIEW (BOTTOM VIEW)

Underside view


102L
101L
103L
104L
106
105L
112T
111B
115
113B
114
116 I
117 I
118T
126
120T
127
125T
121T
128I
129
123T
122T
119T

▬ 5322 390 10096 Oil
4822 390 20154 Grease

Cleaning set:
4822 390 80166 Isopropanol
4822 466 91591 Cleaning cloth

10.5 Mechanical parts list

Pos.	Description	KITS								Code number 4822
		B	I	L	P	Q	S	T	U	
1	Rec. protection lever (with spring)									402 10202
2	Chassis mounting spring (2x)									492 71022
5	Main brake left				P					
6	Main brake spring (2x)				P					
9	Damping roller ***)**									528 70782
10	Main brake right				P					
11	Tension arm spring									492 33317
12	Tension crank									403 70551
13	Slip ring								U	
14	Tension band				P					
15	Tension arm									403 70547
16	Erase head									249 10522
17	Swivelling gear								U	
18	Brake gear (2x)								U	
19	Swivelling plate								U	
20	Reel table (S)								U	
20a	Reel table (T)								U	
21	Headamplifier holder							T		
22	Bracket							T		
23	Roller unit left									528 70771
24	Loading arm left	B								
25	Loading arm right	B								
26	Roller unit right									528 70772
27	Loading gear	B								
30	Reverse clip					Q				
31	Reverse lever					Q				
32	Intermediate lever					Q				
34	Scanner assy. 2/0 (Head disc and motor)									**4803** 218 00011
34	Scanner assy. 2/0-LP (Head disc and motor)									**4803** 218 00021
34	Scanner assy. 4/0 (Head disc and motor)									**4803** 218 00031
34	Scanner assy. 4/2 (Head disc and motor)									**4803** 218 00041
35	Cleaning roller									528 70773
36	A/C Head (with clip and screws)									249 10468
37	Pressure roller (with spring)									528 70774
38	Threading motor									361 10809
39	Threading belt									358 20421
40	Motor holder							T		
41	Pressure roller guide						S			
42	Reverse brake				P					
44	Slider gear	B					S			
45	Cam wheel						S			
46	Cam shaft						S			
47	Pulley shaft									528 81462
48	Worm shaft						S			
49	Chassis mounting clip							T		
50	WD-holder							T		

Pos.	Description	KITS								Code number 4822
		B	I	L	P	Q	S	T	U	
101	Cassette loader trigger			L						
102	Clip			L						
103	Cassette loader gear1			L						
104	Cassette loader spring			L						
105	Cassette loader gear2			L						
106	Spindle									535 93277
111	Cam wheel reverse	B								
112	Tension lever							T		
113	Cam wheel tension	B								
114	Clutch lever (with spring)									403 70549
115	Clutch									528 20736
116	Changing gear		I							
117	Double gear		I							
118	Light prism							T		
119	Init flap and holder							T		
120	Cam wheel lever							T		
121	S-VHS lever							T		
122	Prism rihgt							T		
123	Prism left							T		
125	Main slider							T		
126	Driving belt									358 31166
127	Capstan motor (with screws)									361 10805
129	Reverse kicker with transmission gears *)									522 20451
128	Gear pulley		I							
150	Lift									443 64112
KIT	B									310 31955
KIT	I									310 31963
KIT	L									310 32116
KIT	P									310 32191
KIT	Q									310 10658
KIT	S									310 10661
KIT	T									310 10662
KIT	U						3103			109 09190

*) optional

Um eine hohen Reparaturstandard zu gewährleisten sind mit Ausnahme von Kit T immer alle im Kit enthaltenen Teile zu tauschen.

In order to guarantee a high repairstandard all spare parts included in a kit have to be replaced with the exception of kit T.

Per una riparazione garantita ocorre sostituire tutti i pezzi contenuti nei kit, fatta eccetione per il kit T.

Para obtener un estandár de reparaciones elevado,es necesario cambiar todas las partes contenidas en el kit, la única exceptión es para el kit T.

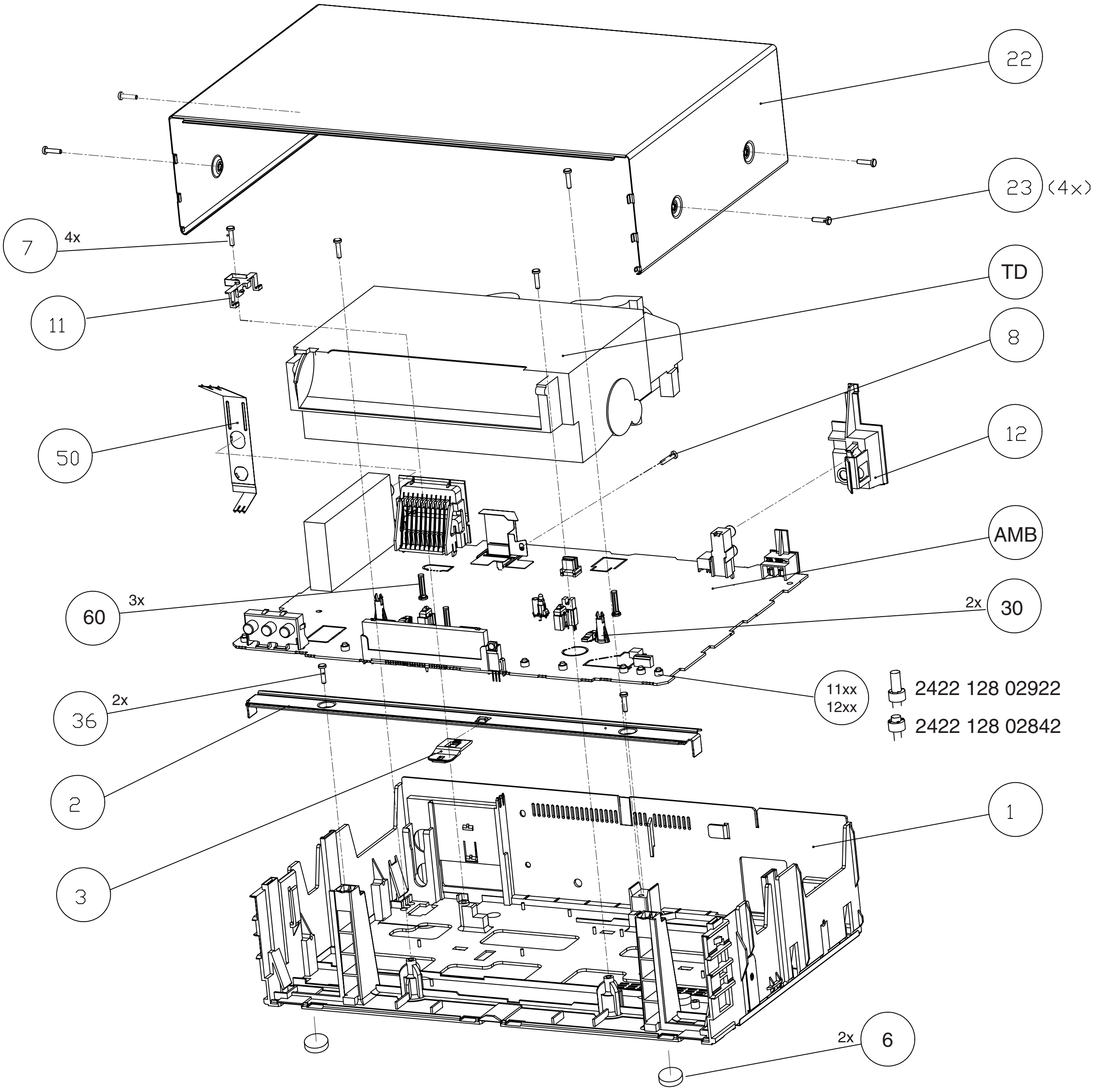
A fin d'obtenir un standard de réparations élevé, toutes les pièces de rechange incluses dans un kit sont à remplacer, exception faite du kit T.

Om een hoge reparatiekwaliteit te waarbogen moeten, met uitzondering van kit T, altijd alle zich in een kit bevindende onderdelen worden vervangen.

Engineer's remarks:

11. Exploded view and Parts list

11.1 Exploded view set


22
23 (4x)
7
4x
TD
11
8
12
50
AMB
60
3x
2x
30
11xx
12xx
2422 128 02922
2422 128 02842
36
2x
2
1
3
2x
6

11.2 Set Parts List

Pos	Service code	Description
1	3103 138 91700	FRAME ASSY 1SCART
	3103 138 91710	FRAME ASSY 2SCART
	3103 138 90120	FRAME ASSY STEREO
2	3103 141 22800	BRACKET
3	3103 104 20960	CATCH
6	3103 184 00830	FOOT
7	3103 100 42400	SCREW 3,5X16
8	3103 100 42530	SCREENING SCREW
11	3103 104 01530	WD-HOLDER
12	3103 104 25950	CHINCH COVER

Pos	Service code	Description
22	3103 141 23590	COVER VR607, 617/02/07/16
	3103 141 23160	COVER VRx01, xxDVxx, SBxx
	3103 141 23680	COVER VR260,VR460
22	3103 141 23500	COVER VRx1x,VRx00,VR605
23	3112 400 40220	PLASTITE SCREW 3,5X10
30	3103 107 61760	DISTANZHOLDER DECK
36	2511 076 50014	TORX SCREW 3X12
50	3103 111 02560	SPRING
60	3103 104 20110	DISTANZHOLDER MOBO

11.3 Direction for use

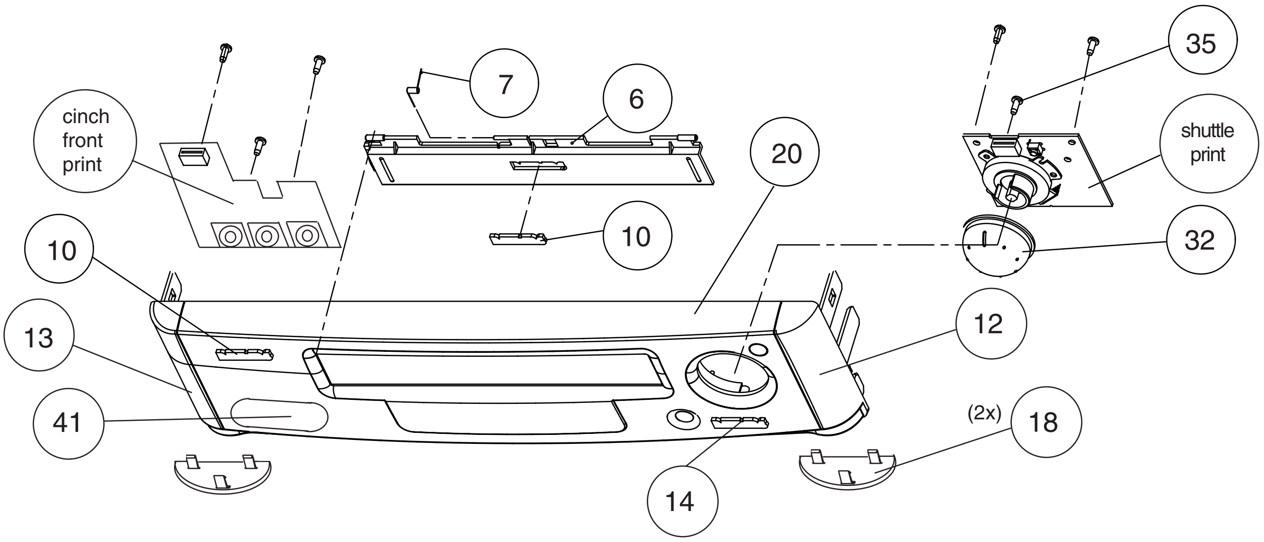
Service code	Direction for use
3103 166 25660	VR101/02 PT, ES
3103 166 25680	VR101/02 D, FR, NL, I
3103 166 25690	VR101/02 DK, FI, NO, SW
3103 166 25700	VR101/39 FR
3103 166 25710	VR101/58 EN, PL, RU, SK, TS, HU
3103 166 24690	VR110/02 PT, ES
3103 166 24700	VR110/02 GR
3103 166 24720	VR110/02 D, FR, NL, I
3103 166 24730	VR110/02 DK, FI, NO, SW
3103 166 24680	VR110/07 EN
3103 166 25020	VR110/58 EN, PL, RU, SK, TS, HU
3103 166 26040	VR200A/02 PT, ES
3103 166 26050	VR200A/02 GR
3103 166 26060	VR200A/02 DE, EN
3103 166 26070	VR200A/02 D, FR, NL, I
3103 166 26080	VR200A/02 DK, FI, NO, SW
3103 166 26300	VR200A/07 EN
3103 166 26310	VR200A/39 FR
3103 166 26320	VR200A/58 EN, PL, RU, SK, TS, HU
3103 166 24910	VR210/02 PT, ES
3103 166 24920	VR210/02 GR
3103 166 24940	VR210/02 D, FR, NL, I
3103 166 24950	VR210/02 DK, FI, NO, SW
3103 166 25040	VR210/07 EN
3103 166 25060	VR210/39 FR
3103 166 25310	VR210/58 EN, PL, RU, SK, TS, HU
3103 166 26220	VR210/60 FR
3103 166 25470	VR215/02 PT, ES
3103 166 25500	VR215/02 DK, FI, NO, SW
3103 166 25490	VR215/02 D, FR, NL, I
3103 166 26140	VR215/07 EN
3103 166 26090	VR217/02 PT, ES
3103 166 26100	VR217/02 GR
3103 166 26120	VR217/02 D, FR, NL, I
3103 166 26130	VR217/02 DK, FI, NO, SW
3103 166 27570	VR217/07 EN
3103 166 25160	VR260/02 PT, ES
3103 166 25180	VR260/02 D, FR, NL, I
3103 166 25190	VR260/02 DK, FI, NO, SW
3103 166 25320	VR260/07 EN
3103 166 25300	VR260/39 FR
3103 166 25290	VR260/58 EN, PL, RU, SK, TS, HU
3103 166 26500	VR400A/58 EN, PL, RU, SK, TS, HU
3103 166 25020	VR401/58 EN, PL, RU, SK, TS, HU
3103 166 24910	VR410/02 PT, ES
3103 166 24920	VR410/02 GR
3103 166 24940	VR410/02 D, FR, NL, I
3103 166 24950	VR410/02 DK, FI, NO, SW
3103 166 25060	VR410/39 FR
3103 166 25200	VR410/58 EN, PL, RU, SK, TS, HU
3103 166 25340	VR460/02 FR, NL, I, PT, ES
3103 166 25300	VR460/39 FR
3103 166 25290	VR460/58 EN, PL, RU, SK, TS, HU
3103 166 25730	VR501/02 D, FR, NL, I
3103 166 25740	VR501/16 FR, NL, I, PT, ES
3103 166 25750	VR501/16 DK, FI, NO, SW

Service code	Direction for use
3103 166 25770	VR501/58 EN, PL, RU, SK, TS, HU
3103 166 25080	VR510/02 D, FR, NL, I
3103 166 25090	VR510/02 GR
3103 166 25230	VR510/07 EN
3103 166 25210	VR510/16 FR, NL, I, PT, ES
3103 166 25220	VR510/16 DK, FI, NO, SW
3103 166 25510	VR510/39 FR
3103 166 25250	VR510/58 EN, PL, RU, SK, TS, HU
3103 166 27030	VR600A/02 D, FR, NL, I
3103 166 27040	VR600A/02 GR
3103 166 27580	VR600A/07 EN
3103 166 27510	VR600A/16 DK, FI, NO, SW
3103 166 27520	VR600A/16 FR, NL, PT, ES
3103 166 26400	VR600A/39 FR
3103 166 26510	VR605A/58 EN, PL, RU, SK, TS, HU
3103 166 27530	VR607A/02 D
3103 166 27610	VR607A/02 I,NL
3103 166 27560	VR607A/07 EN
3103 166 27540	VR607A/16 DK, FI, NO, SW
3103 166 27550	VR607A/16 FR, NL, PT, ES
3103 166 26410	VR607A/39 FR
3103 166 25110	VR610/02 D, FR, NL, I
3103 166 25120	VR610/02 GR
3103 166 25260	VR610/07 EN
3103 166 25350	VR610/16 FR, NL, PT, ES
3103 166 25360	VR610/16 DK, FI, NO, SW
3103 166 25520	VR610/39 FR
3103 166 26230	VR610/60 FR
3103 166 25380	VR617/02 D, FR, NL, I
3103 166 26160	VR617/07 EN
3103 166 25590	VR617/16 FR, NL, PT, ES
3103 166 25600	VR617/16 DK, FI, NO, SW
3103 166 25530	VR617/58 SK, TS, HU
3103 166 27500	VR617/58 EN, PL, RU
3103 166 24740	SB130/03 NL
3103 166 24820	SB130/38 FR
3103 166 24870	SB135/03 NL
3103 166 24880	SB135/07 EN
3103 166 24750	SB135/11 FR, NL
3103 166 24760	SB135/16 ES
3103 166 24890	SB135/38 FR
3103 166 24750	SB435/11 FR, NL
3103 166 24890	SB435/38 FR
3103 166 25000	SB535/38 FR
3103 166 24980	SB635/03 NL
3103 166 25440	SB635/11 FR, NL
3103 166 25450	SB635/16 ES
3103 166 24970	SB635/38 FR
3103 166 24980	SB735/03 NL
3103 166 25440	SB735/11 FR, NL
3103 166 24970	SB735/38 FR
3103 166 24960	20DV20/39 FR
3103 166 25030	25DV20/39 FR
3103 166 25030	45DV20/39 FR
3103 166 25890	65DV20/39 FR

Service Code	Description Control Panel pos 20
3103 138 91110	CONTROL PANEL VR101/02/58
3103 138 91120	CONTROL PANEL VR101/39,
3103 138 90100	CONTROL PANEL VR110/02/07/58
3103 138 88720	CONTROL PANEL VR200A/02
3103 138 89180	CONTROL PANEL VR200A/07
3103 138 89060	CONTROL PANEL VR200A/39
3103 138 89170	CONTROL PANEL VR200A/58
3103 138 90020	CONTROL PANEL VR210/02/58
3103 138 90300	CONTROL PANEL VR210/07
3103 138 90280	CONTROL PANEL VR210/39/60
3103 138 90040	CONTROL PANEL VR215/02
3103 138 90310	CONTROL PANEL VR215/07
3103 138 90470	CONTROL PANEL VR217/02
3103 138 91460	CONTROL PANEL VR217/07
3103 138 90050	CONTROL PANEL VR260/02/58
3103 138 90340	CONTROL PANEL VR260/07
3103 138 90320	CONTROL PANEL VR260/39
3103 138 89160	CONTROL PANEL VR400A/58
3103 138 91010	CONTROL PANEL VR401/58
3103 138 90350	CONTROL PANEL VR410/02/58
3103 138 90360	CONTROL PANEL VR410/39
3103 138 90380	CONTROL PANEL VR460/02/58
3103 138 90110	CONTROL PANEL VR460/39
3103 138 91140	CONTROL PANEL VR501/02
3103 138 91170	CONTROL PANEL VR501/16/58
3103 138 90400	CONTROL PANEL VR510/02
3103 138 90420	CONTROL PANEL VR510/07
3103 138 90410	CONTROL PANEL VR510/16/58
3103 138 90010	CONTROL PANEL VR510/39
3103 138 88750	CONTROL PANEL VR600A/02
3103 138 89260	CONTROL PANEL VR600A/07
3103 138 89270	CONTROL PANEL VR600A/16
3103 138 89250	CONTROL PANEL VR600A/39
3103 138 89210	CONTROL PANEL VR605A/58
3103 138 90180	CONTROL PANEL VR607A/02
3103 138 90160	CONTROL PANEL VR607A/07
3103 138 90170	CONTROL PANEL VR607A/16
3103 138 90200	CONTROL PANEL VR607A/39
3103 138 90430	CONTROL PANEL VR610/02
3103 138 90440	CONTROL PANEL VR610/07
3103 138 90450	CONTROL PANEL VR610/16
3103 138 90260	CONTROL PANEL VR610/39/60
3103 138 90460	CONTROL PANEL VR617/02
3103 138 90070	CONTROL PANEL VR617/07
3103 138 91730	CONTROL PANEL VR617/16
3103 138 90480	CONTROL PANEL VR617/58
3103 138 90490	CONTROL PANEL SB130/03
3103 138 90500	CONTROL PANEL SB130/38
3103 138 90550	CONTROL PANEL SB135/03
3103 138 90540	CONTROL PANEL SB135/07
3103 138 90520	CONTROL PANEL SB135/11
3103 138 90530	CONTROL PANEL SB135/16
3103 138 90510	CONTROL PANEL SB135/38
3103 138 90560	CONTROL PANEL SB435/11
3103 138 90570	CONTROL PANEL SB435/38
3103 138 90580	CONTROL PANEL SB535/38
3103 138 90620	CONTROL PANEL SB635/03
3103 138 90630	CONTROL PANEL SB635/11
3103 138 90610	CONTROL PANEL SB635/16
3103 138 90600	CONTROL PANEL SB635/38
3103 138 90660	CONTROL PANEL SB735/03
3103 138 90650	CONTROL PANEL SB735/11
3103 138 90640	CONTROL PANEL SB735/38
3103 138 90690	CONTROL PANEL 20DV20/39
3103 138 90700	CONTROL PANEL 25DV20/39
3103 138 90710	CONTROL PANEL 45DV20/39
3103 138 90720	CONTROL PANEL 65DV20/39

Service Code	Description Lift Flap pos 6
3103 178 29670	LIFT FLAP VR101/02/58
3103 178 29680	LIFT FLAP VR101/39
3103 178 28620	LIFT FLAP VR110/02/07/58
3103 178 25180	LIFT FLAP VR200A/02/07
3103 178 25240	LIFT FLAP VR200A/39
3103 178 25190	LIFT FLAP VR200A/58
3103 178 28830	LIFT FLAP VR210/02/07/39/58/60
3103 178 29320	LIFT FLAP VR215/02/07, VR217/07
3103 178 31200	LIFT FLAP VR217/02
3103 178 29180	LIFT FLAP VR260/02/07/58
3103 178 29280	LIFT FLAP VR260/39
3103 178 25170	LIFT FLAP VR400A/58
3103 178 29190	LIFT FLAP VR401/58
3103 178 28980	LIFT FLAP VR410/02/58
3103 178 29020	LIFT FLAP VR410/39
3103 178 29350	LIFT FLAP VR460/02/58
3103 178 29560	LIFT FLAP VR460/39
3103 178 29690	LIFT FLAP VR501/02/16/58
3103 178 28950	LIFT FLAP VR510/02/07/16/58
3103 178 29580	LIFT FLAP VR510/39
3103 178 25460	LIFT FLAP VR600A/02
3103 178 25540	LIFT FLAP VR600A/07/16
3103 178 25510	LIFT FLAP VR600A/39
3103 178 26170	LIFT FLAP VR605A/58
3103 178 28250	LIFT FLAP VR607A/02
3103 178 28200	LIFT FLAP VR607A/07/16/39
3103 178 29070	LIFT FLAP VR610/02/07/16
3103 178 29610	LIFT FLAP VR610/39/60
3103 178 31210	LIFT FLAP VR617/02/16/07
3103 178 29380	LIFT FLAP VR617/58
3103 178 28630	LIFT FLAP SB130/03
3103 178 28690	LIFT FLAP SB130/38
3103 178 28710	LIFT FLAP SB135/03
3103 178 28720	LIFT FLAP SB135/07
3103 178 28640	LIFT FLAP SB135/11
3103 178 28650	LIFT FLAP SB135/16
3103 178 28730	LIFT FLAP SB135/38
3103 178 28750	LIFT FLAP SB435/11
3103 178 28900	LIFT FLAP SB435/38
3103 178 28890	LIFT FLAP SB535/38
3103 178 28880	LIFT FLAP SB635/03
3103 178 29250	LIFT FLAP SB635/11
3103 178 29530	LIFT FLAP SB635/16
3103 178 28870	LIFT FLAP SB635/38
3103 178 28860	LIFT FLAP SB735/03
3103 178 30200	LIFT FLAP SB735/11
3103 178 29540	LIFT FLAP SB735/38
3103 178 28910	LIFT FLAP 20DV20/39
3103 178 29120	LIFT FLAP 25DV20/39
3103 178 29940	LIFT FLAP 45DV20/39
3103 178 29950	LIFT FLAP 65DV20/39

11.4 Front Parts List



Pos	Service code	Description
7	3103 111 02450	LEG SPRING
10	3112 210 06760	WORDMARK PHILIPS VR200,400
	3103 110 00960	WORDMARK PHILIPS VR607
	3112 210 06760	WORDMARK PHILIPS VR110,401,501,60x
	3103 110 01530	WORDMARK PHILIPS VR21x,x60,410,61x,510
12	3103 104 25620	SIDE CAP RIGHT VR610,617
13	3103 104 25610	SIDE CAP LEFT VR610,617
14	3103 110 01510	WORDMARK TURBO DRIVE VR607
	3103 110 01480	WORDMARK TURBO DRIVE VR600
18	3103 178 28050	FOOT ASSY VR600,605
	3103 178 28260	FOOT ASSY VR607
	3103 178 29100	FOOT ASSY VR610,617
32	3103 178 28270	SHUTTLE KNOB ASSY VR607
	3103 178 25320	SHUTTLE KNOB ASSY VR605
35	3103 100 41430	SCREW 2.9 x 8
41	3103 178 29140	AV-COVER GB VR260,460
	3103 178 29260	AV-COVER F VR260,460
	3103 178 25430	AV-COVER GB VR600
	3103 178 25500	AV-COVER F VR600
	3103 178 28210	AV-COVER GB VR607
	3103 178 28280	AV-COVER F VR607
	3103 178 29130	AV-COVER GB VR610,617
	3103 178 29590	AV-COVER F VR610
	4822 214 13088	ASP10 SHUTTLE PRINT
	310 319 884 520	ACP10 CINCH PRINT FRONT
12	310 317 831 330	SIDE CAP RIGHT SILVER VR617/02/07/16
13	310317831340	SIDE CAP LEFT SILVER VR617/02/07/16
18	310317831310	FOOT ANY SILVER VR617/02/07/16
41	310317831350	AV-COVER SILVER VR617/02/07/16

12. Spare parts list

MOBO

Various

1300⚠	3103 100 23910	MAINS PLUG
1708	2422 034 11514	CONNECTOR 1 PIN
1911	2422 025 14521	CONNECTOR 11 PIN
1912	8203 107 91680	CONNECTOR 9 PIN
1941	2422 026 04294	PHONES CONNECTOR
1946	3103 107 20720	CAPSTAN CONNECT.
1947	2422 025 14512	CONNECTOR 3 PIN
1948	2422 025 14515	CONNECTOR 6 PIN
1951	3103 100 24010	SCART SOCKET E1
1952	3103 100 24210	SCART SOCKET E2
1954	3103 100 24250	TRIPLE PIN JACK
1955	2422 025 14515	CONNECTOR 6 PIN
1956	2422 026 05087	CINCH CONNECTOR
1961	2422 025 09405	CONNECTOR 2 PIN
1965	2422 025 14516	CONNECTOR 7 PIN
1969	2422 025 14532	CONNECTOR 3 PIN
1982	2422 025 16742	CONNECTOR 8 PIN
0005	3103 104 25900	DISPLAY HOLDER
0007	3103 107 61690	TACHO-HOLDER
0008	3103 107 61840	TACHO-HOLDER
0020	3103 150 12050	SENSORHOLDER
0021	3103 107 61680	SENSORHOLDER
0022	3103 150 12050	SENSORHOLDER
0200	3103 107 20430	CONNECTOR 7P
1001	2422 543 01125	CRYSTAL 4.43MHz
1101	2422 128 02842	SWITCH short
1101	2422 128 02922	SWITCH long
1102	2422 128 02707	SWITCH
1105	2422 128 02922	SWITCH
1105	2422 128 02842	SWITCH
1108	2422 128 02707	SWITCH
1109	2422 128 02842	SWITCH
1114	2422 128 02707	SWITCH
1118	2422 128 02842	SWITCH
1119	2422 128 02842	SWITCH
1119	2422 128 02707	SWITCH
1119	2422 128 02922	SWITCH
1122	2422 128 02842	SWITCH
1123	2422 128 02842	SWITCH
1123	2422 128 02707	SWITCH
1124	2422 128 02707	SWITCH
1125	2422 128 02922	SWITCH
1127	2422 128 02842	SWITCH
1151	2422 128 02842	SWITCH
1152	2422 128 02842	SWITCH
1152	2422 128 02922	SWITCH
1153	2422 128 02922	SWITCH
1156	2422 128 02922	SWITCH
1156	2422 128 02842	SWITCH
1157	2422 128 02842	SWITCH
1158	2422 128 02922	SWITCH
1159	2422 128 02707	SWITCH
1161	2422 128 02842	SWITCH
1162	2422 128 02842	SWITCH
1163	2422 128 02842	SWITCH
1170	2422 543 00056	CRYSTAL 32.768kHz
1171	2422 543 00761	CRYSTAL 16MHz
1201	2422 128 02842	SWITCH
1204	2422 128 02842	SWITCH
1204	2422 128 02922	SWITCH
1204	2422 128 02707	SWITCH
1207	2422 128 02707	SWITCH
1208	2422 128 02842	SWITCH
1210	2422 128 02707	SWITCH
1210	2422 128 02842	SWITCH
1213	2422 128 02842	SWITCH
1213	2422 128 02922	SWITCH
1216	2422 128 02707	SWITCH
1216	2422 128 02842	SWITCH
1217	2422 128 02922	SWITCH
1217	2422 128 02842	SWITCH
1218	2422 128 02707	SWITCH
1221	2422 128 02707	SWITCH
1221	2422 128 02842	SWITCH
1222	2422 128 02707	SWITCH
1222	2422 128 02842	SWITCH
1222	2422 128 02922	SWITCH
1253	2422 128 02707	SWITCH
1301⚠	3103 138 86490	FUSE T1.25A
1302⚠	2422 549 43073	SURGE PROTECT
1304⚠	2422 086 10919	PROT 125mA
1306⚠	2422 086 10956	PROT 1.6A
1308⚠	2422 086 10955	PROT 1.25A
1309⚠	2422 086 10514	FUSE T100mA
1501⚠	2422 086 10919	PROT 125mA
1701	2422 542 90082	TUMOD TCBZ4-004A SEC BOOST
1702	2422 542 90081	TUMOD TCBZ4-002A BG/I/DK
1703	2422 549 44341	OFWK9656M
1704	2422 549 42004	OFWK2955M
1704	2422 549 42273	OFWJ1980M
1704	2422 549 42068	OFWG3956M
1704	2422 549 41518	OFWG1961M
1704	2422 549 41801	OFWG1984M
1704	9322 042 72682	OFWK3953M
1705	2422 549 42391	FILTER TPW 6,0/6,5MHz
1705	2422 549 41433	FILTER TPS 6,5MHz
1705	2422 549 41595	FILTER BS 5.5MHz
1706	2422 549 42824	FILTER EFC 5,5MHz
1706	2422 549 42825	FILTER EFC 6,0MHz
1706	2422 549 42826	FILTER EFC 6,5MHz
1707	2422 549 42825	FILTER EFC 6,0MHz
1707	2422 549 42826	FILTER EFC 6,5MHz
1760	2422 543 01119	CRYSTAL 4MHz
1761	2422 543 00781	CRYSTAL 18.432MHz
1801	3103 107 90110	SWITCH ASSY
1802	3103 107 90110	SWITCH ASSY

⊣⊢

2000	3198 017 21040	100 nF 50V
2001	3198 017 01030	10 nF 50V
2002	3198 017 01030	10 nF 50V
2003	3198 029 31090	10 µF 25V
2004	3198 017 01030	10 nF 50V
2005	3198 017 21040	100 nF 50V
2006	3198 029 31090	10 µF 25V
2007	3198 017 01030	10 nF 50V
2008	3198 017 02230	22 nF 50V
2009	3198 017 21050	1 µF 16V
2010	3198 017 21050	1 µF 16V
2011	3198 017 02230	22 nF 50V
2012	3198 017 01030	10 nF 50V
2013	3198 017 01030	10 nF 50V
2014	3198 017 24730	47 nF 50V
2015	3198 017 01030	10 nF 50V
2016	3198 017 01030	10 nF 50V
2017	3198 017 21050	1 µF 16V
2018	3198 017 21040	100 nF 50V
2019	3198 029 31090	10 µF 25V
2020	3198 029 31090	10 µF 25V
2021	3198 017 01040	100 nF 16V
2022	3198 029 31090	10 µF 25V
2023	3198 017 21050	1 µF 16V
2024	3198 029 04790	47 µF 6.3V
2025	3198 017 01030	10 nF 50V
2026	3198 017 21040	100 nF 50V
2027	3198 017 21050	1 µF 16V
2028	3198 017 21040	100 nF 50V
2029	3198 017 21040	100 nF 50V
2030	3198 017 01030	10 nF 50V
2031	3198 017 24740	470 nF 16V
2032	3198 016 02790	27 pF 50V
2033	3198 017 01030	10 nF 50V
2034	3198 017 01020	1 nF 50V
2035	3198 029 22290	22 µF 16V
2036	3198 029 31090	10 µF 25V
2037	3198 017 21050	1 µF 16V
2038	3198 023 21040	100 nF 25V
2039	3198 017 21050	1 µF 16V
2040	3198 017 01030	10 nF 50V
2041	3198 025 54780	4.7 µF 50V
2042	3198 017 01040	100 nF 16V
2043	3198 029 31090	10 µF 25V
2044	3198 017 21040	100 nF 50V
2045	3198 017 01040	100 nF 16V
2046	3198 016 02210	220 pF 50V
2047	3198 016 04780	4.7 pF 50V
2048	2022 552 05334	180 pF 50V
2049	3198 017 01030	10 nF 50V
2050	3198 016 02290	22 pF 50V
2051	2238 861 14391	390 pF 50V
2053	3198 017 01030	10 nF 50V
2054	3198 017 01030	10 nF 50V
2055	3198 016 02790	27 pF 50V
2056	3198 016 04790	47 pF 50V
2071	3198 017 01030	10 nF 50V
2072	3198 016 01510	150 pF 50V
2073	3198 029 21010	100 µF 16V
2074	2022 552 05335	220 pF 50V
2075	3198 017 01030	10 nF 50V
2076	3198 023 21040	100 nF 25V
2077	3198 017 01040	100 nF 16V
2079	3198 016 08290	82 pF 50V
2080	3198 016 01010	100 pF 50V
2082	3198 017 01030	10 nF 50V
2083	3198 017 01030	10 nF 50V
2084	3198 029 31090	10 µF 25V
2085	3198 017 24740	470 nF 16V
2086	3198 017 01030	10 nF 50V
2087	3198 016 06810	680 pF 50V
2088	3198 017 21050	1 µF 16V
2089	3198 017 02230	22 nF 50V
2090	3198 016 02210	220 pF 50V
2096	3198 017 01040	100 nF 16V
2097	3198 016 01090	10 pF 50V
2170	3198 029 22290	22 µF 16V
2171	3198 023 21040	100 nF 25V
2173	3198 023 21040	100 nF 25V
2174	2020 025 90019	220 mF 5.5V
2175	3198 016 01890	18 pF 50V
2176	3198 016 01590	15 pF 50V
2177	3198 016 02290	22 pF 50V
2178	3198 016 02290	22 pF 50V
2179	3198 017 24740	470 nF 16V
2180	3198 017 01030	10 nF 50V
2181	3198 023 21040	100 nF 25V
2182	3198 029 24790	47 µF 16V
2300	3198 017 01040	100 nF 16V
2301	3198 025 51090	10 µF 50V
2302	2020 558 90442	47 pF 2kV
2303	3198 017 03320	3.3 nF 50V
2304	2020 558 90442	47 pF 2kV
2305	2020 021 91536	330 µF 16V
2308	2022 318 00108	47 nF 250V
2309	2020 021 91332	47 µF 50V
2310	2020 021 91529	22 µF 50V
2311	2020 021 91527	100 µF 10V
2312	2020 021 91528	560 µF 6.3V
2313	3198 025 01020	1000 µF 6.3V
2314	3198 023 21040	100 nF 25V
2315	3198 017 01030	10 nF 50V
2316	2022 330 00014	100 nF 275V
2317⚠	2020 554 90127	2.2 nF 250V
2318	2020 021 91525	18 µF 385V
2319	3198 025 51090	10 µF 50V
2325	3198 017 01030	10 nF 50V
2327	3198 017 01040	100 nF 16V
2328	2222 910 16649	100 nF 25V
2328	2238 910 15649	100 nF 25V
2459	3198 017 02230	22 nF 50V
2460	8203 107 21070	68 pF 50V
2461	3198 029 21010	100 µF 16V
2462	2020 012 93691	220 µF 16V
2463	3198 017 21040	100 nF 50V
2464	3198 017 21040	100 nF 50V
2465	3198 023 04730	47 nF 25V
2466	3198 023 04730	47 nF 25V
2467	3198 023 04730	47 nF 25V
2468	2022 552 05236	5.6 nF 50V
2469	3198 017 01040	100 nF 16V
2470	3198 029 21010	100 µF 16V
2471	3198 017 01040	100 nF 16V
2472	3198 017 02230	22 nF 50V
2473	3198 017 01030	10 nF 50V
2474	3198 017 21040	100 nF 50V
2475	3198 016 01010	100 pF 50V
2476	3198 017 01040	100 nF 16V
2477	3198 017 03330	33 nF 50V
2479	3198 017 04720	4.7 nF 50V
2480	3198 017 02220	2.2 nF 50V
2481	3198 029 24790	47 µF 16V
2482	3198 017 21040	100 nF 50V
2483	3198 017 01030	10 nF 50V
2484	3198 017 01030	10 nF 50V
2485	3198 017 21040	100 nF 50V
2486	3198 017 04720	4.7 nF 50V
2487	3198 025 31010	100 µF 25V
2488	3198 029 31090	10 µF 25V
2490	3198 025 21010	100 µF 16V
2492	2020 800 00151	50 pF 100V TRIM
2500	3198 029 02210	220 µF 6.3V
2501	3198 023 21040	100 nF 25V
2502	3198 023 21040	100 nF 25V
2503	3198 023 21040	100 nF 25V
2504	3198 017 24740	470 nF 16V
2505	3198 023 04730	47 nF 25V
2506	2238 910 15649	100 nF 25V
2507	3198 016 01210	120 pF 50V
2509	3198 017 01020	1 nF 50V
2530	3198 023 21040	100 nF 25V
2531	3198 029 31090	10 µF 25V

2532	3198 017 02220	2.2 nF 50V
2533	3198 017 02220	2.2 nF 50V
2534	3198 016 01810	180 pF 50V
2535	3198 016 01810	180 pF 50V
2536	3198 017 21050	1 µF 16V
2537	3198 017 21050	1 µF 16V
2601	3198 023 21040	100 nF 25V
2602	3198 029 22290	22 µF 16V
2603	3198 029 24790	47 µF 16V
2604	3198 023 21040	100 nF 25V
2605	3198 023 21040	100 nF 25V
2606	3198 023 21040	100 nF 25V
2607	3198 029 24790	47 µF 16V
2608	3198 017 01030	10 nF 50V
2609	3198 029 24790	47 µF 16V
2610	3198 029 31090	10 µF 25V
2611	3198 023 21040	100 nF 25V
2612	3198 017 21050	1 µF 16V
2613	3198 029 31090	10 µF 25V
2614	3198 023 21040	100 nF 25V
2615	3198 016 03310	330 pF 50V
2616	3198 017 01020	1 nF 50V
2617	3198 017 02220	2.2 nF 50V
2618	3198 023 04730	47 nF 25V
2619	2022 552 05341	820 pF 50V
2620	3198 029 24790	47 µF 16V
2621	3198 017 01030	10 nF 50V
2623	3198 016 01020	1 nF 50V
2624	3198 029 21010	100 µF 16V
2625	2020 300 90611	27 nF 50V
2626	3198 017 04720	4.7 nF 50V
2627	2022 552 05234	3.9 pF 50V
2628	3198 029 22290	22 µF 16V
2630	3198 017 01030	10 nF 50V
2631	3198 017 02220	2.2 nF 50V
2632	3198 017 21050	1 µF 16V
2633	3198 029 31090	10 µF 25V
2650	3198 029 31090	10 µF 25V
2651	3198 029 31090	10 µF 25V
2652	3198 023 21040	100 nF 25V
2653	3198 017 06820	6.8 nF 50V
2654	3198 017 01030	10 nF 50V
2655	3198 029 24790	47 µF 16V
2656	3198 029 31090	10 µF 25V
2657	3198 023 22240	220 nF 25V
2658	3198 023 22240	220 nF 25V
2659	3198 023 22240	220 nF 25V
2660	3198 029 52280	2.2 µF 50V
2661	3198 023 22240	220 nF 25V
2662	3198 023 22240	220 nF 25V
2663	3198 029 52280	2.2 µF 50V
2664	3198 023 22240	220 nF 25V
2665	3198 023 22240	220 nF 25V
2666	3198 023 22240	220 nF 25V
2667	3198 017 22250	2.2 µF 10V
2668	3198 017 22250	2.2 µF 10V
2669	3198 023 21040	100 nF 25V
2670	3198 023 22240	220 nF 25V
2671	3198 029 31090	10 µF 25V
2672	3198 029 52280	2.2 µF 50V
2673	3198 029 21010	100 µF 16V
2674	3198 017 02230	22 nF 50V
2675	3198 029 24790	47 µF 16V
2676	3198 017 21050	1 µF 16V
2678	3198 017 01040	100 nF 16V
2679	3198 029 31090	10 µF 25V
2680	3198 017 06820	6.8 nF 50V
2681	3198 029 04790	47 µF 6.3V
2700	3198 016 01090	10 pF 50V
2701	2020 021 91355	2.2 µF 50V
2702	3198 023 21040	100 nF 25V
2703	3198 029 22290	22 µF 16V
2704	3198 016 04710	470 pF 50V
2705	3198 017 01030	10 nF 50V
2706	3198 029 31090	10 µF 25V
2707	3198 023 21040	100 nF 25V
2708	3198 023 22240	220 nF 25V
2709	2020 552 94914	8.2 pF 50V
2710	3198 023 21040	100 nF 25V
2712	3198 017 01020	1 nF 50V
2713	3198 016 01210	120 pF 50V
2714	3198 016 02210	220 pF 50V
2715	3198 029 52280	2.2 µF 50V
2718	3198 017 02230	22 nF 50V
2719	3198 029 22290	22 µF 16V
2720	2020 021 91527	100 µF 10V
2721	3198 023 21040	100 nF 25V
2722	3198 016 04710	470 pF 50V
2723	3198 023 21040	100 nF 25V
2724	3198 017 01030	10 nF 50V
2725	3198 017 21040	100 nF 50V
2726	3198 029 52280	2.2 µF 50V
2727	3198 016 01010	100 pF 50V
2728	3198 016 01010	100 pF 50V
2760	3198 017 03320	3.3 nF 50V
2761	3198 017 01040	100 nF 16V
2763	3198 016 06810	680 pF 50V
2764	3198 017 01030	10 nF 50V
2765	3198 017 01040	100 nF 16V
2766	3198 029 31090	10 µF 25V
2767	3198 017 01030	10 nF 50V
2768	3198 029 31090	10 µF 25V
2769	3198 029 31090	10 µF 25V
2770	3198 017 24740	470 nF 16V
2771	3198 016 04790	47 pF 50V
2772	3198 016 06810	680 pF 50V
2773	3198 017 03320	3.3 nF 50V
2775	3198 017 01030	10 nF 50V
2776	3198 025 54780	4.7 µF 50V
2778	3198 017 24740	470 nF 16V
2779	3198 017 24740	470 nF 16V
2780	2022 552 05344	4.7 nF 50V
2781	3198 017 24740	470 nF 16V
2782	3198 029 24790	47 µF 16V
2783	3198 017 01040	100 nF 16V
2784	3198 016 04790	47 pF 50V
2785	3198 017 24740	470 nF 16V
2786	3198 017 24740	470 nF 16V
2787	3198 016 03380	3.3 pF 50V
2788	3198 016 03380	3.3 pF 50V
2789	3198 017 01030	10 nF 50V
2790	3198 029 31090	10 µF 25V
2791	3198 017 01030	10 nF 50V
2792	3198 016 04790	47 pF 50V
2793	3198 017 01020	1 nF 50V
2794	3198 017 01020	1 nF 50V
2795	3198 016 01590	15 pF 50V
2800	3198 017 01040	100 nF 16V
2801	3198 016 02210	220 pF 50V
2802	3198 017 02220	2.2 nF 50V
2803	3198 025 32210	220 µF 25V
2805	3198 017 02220	2.2 nF 50V
2809	3198 029 21010	100 µF 16V
2812	3198 016 03390	33 pF 50V
2814	3198 016 06890	68 pF 50V
2815	3198 016 06890	68 pF 50V
2901	3198 017 01040	100 nF 16V
2902	3198 029 24790	47 µF 16V
2903	3198 029 31090	10 µF 25V
2904	3198 029 31090	10 µF 25V
2905	3198 017 21040	100 nF 50V
2906	3198 016 02290	22 pF 50V
2907	3198 017 21040	100 nF 50V
2908	3198 029 31090	10 µF 25V
2909	3198 017 21040	100 nF 50V
2910	3198 017 21040	100 nF 50V
2911	3198 017 21040	100 nF 50V
2912	3198 017 21040	100 nF 50V
2913	3198 017 21040	100 nF 50V
2914	3198 017 21040	100 nF 50V
2915	3198 029 31090	10 µF 25V
2916	3198 016 04710	470 pF 50V
2917	3198 016 04710	470 pF 50V
2918	3198 016 04710	470 pF 50V
2919	3198 016 04710	470 pF 50V
2920	3198 016 04710	470 pF 50V
2921	3198 016 04710	470 pF 50V
2922	3198 029 31090	10 µF 25V
2923	3198 029 02210	220 µF 6.3V
2924	3198 016 06890	68 pF 50V
2926	3198 016 01010	100 pF 50V
2927	3198 016 01010	100 pF 50V
2928	3198 017 21050	1 µF 16V
2929	3198 017 21050	1 µF 16V
2930	3198 017 01020	1 nF 50V
2931	3198 017 01020	1 nF 50V
2932	3198 016 01010	100 pF 50V
2933	3198 016 01010	100 pF 50V

3000	3198 021 52220	2.2 k 0.1W
3001	3198 021 51520	1.5 k 0.1W
3002	3198 011 01820	1.8 k 0.17W
3003	3198 021 52220	2.2 k 0.1W
3004	3198 021 51020	1 k 0.1W
3005	3198 021 51020	1 k 0.1W
3006	3198 021 58220	8.2 k 0.1W
3007	3198 021 53920	3.9 k 0.1W
3008	3198 021 52250	2.2 M 0.1W
3009	2120 108 91451	1 k 0.1W
3010	3198 021 51020	1 k 0.1W
3011	3198 021 51010	100 Ω 0.1W
3012	3198 021 51010	100 Ω 0.1W
3013	3198 011 03910	390 Ω 0.17W
3014	3198 021 53920	3.9 k 0.1W
3015	3198 021 53910	390 Ω 0.1W
3016	2120 108 92621	2.7 k 1%
3017	2120 108 92618	1.8 k 1%
3018	3198 021 51020	1 k 0.1W
3019	2322 156 26801	680 Ω 1%
3020	2120 108 92624	4.7 k 1%
3021	3198 021 51510	150 Ω 0.1W
3022	3198 011 01020	1 k 0.17W
3023	3198 021 54730	47 k 0.1W
3024	3198 011 04730	47 k 0.17W
3025	3198 021 52210	220 Ω 0.1W
3026	3198 021 51050	1 M 0.1W
3027	3198 021 51080	1 Ω
3028	3198 021 51510	150 Ω 0.1W
3070	3198 021 51020	1 k 0.1W
3071	3198 011 04730	47 k 0.17W
3072	3198 021 51520	1.5 k 0.1W
3073	3198 021 58220	8.2 k 0.1W
3074	2120 108 92514	15 k 1%
3075	3198 021 51040	100 k 0.1W
3076	3198 021 51030	10 k 0.1W
3078	3198 021 51830	18 k 0.1W
3079	3198 021 56810	680 Ω 0.1W
3082	3198 011 06820	6.8 k 0.17W
3083	3198 021 51020	1 k 0.1W
3084	3198 021 52230	22 k 0.1W
3085	3198 021 52730	27 K 0.1W
3086	3198 021 52720	2.7 k 0.1W
3087	3198 021 51030	10 k 0.1W
3088	2120 368 90124	22 k POT
3089	2120 368 90119	1 k POT
3091	3198 021 58220	8.2 k 0.1W
3092	3198 011 04730	47 k 0.17W
3094	3198 021 51230	12 k 0.1W
3095	3198 021 56810	680 Ω 0.1W
3107	3198 021 54730	47 k 0.1W STBY
3108	3198 021 54730	47 k 0.1W STBY
3110	3198 021 54730	47 k 0.1W STBY
3111	3198 021 51080	1 Ω DOWN
3112	3198 021 51040	100 k 0.1W REC
3115	3198 021 51040	100 k 0.1W REC
3115	3198 021 54710	470 Ω 0.1W UP
3116	3198 021 54730	47 k 0.1W STBY
3119	3198 021 54710	470 Ω 0.1W UP
3119	3198 021 51040	100 k 0.1W REC
3120	3198 021 51080	1 Ω DOWN
3120	3198 021 51040	100 k 0.1W REC
3120	3198 021 52220	2.2 k 0.1W MONITOR
3135	3198 021 51080	1 Ω DOWN
3136	3198 021 51080	1 Ω DOWN
3140	3198 021 51040	100 k 0.1W REC
3140	3198 021 52220	2.2 k 0.1W MONITOR
3140	3198 021 54710	470 Ω 0.1W UP
3141	3198 021 52220	2.2 k 0.1W MONITOR
3142	3198 021 51830	18 k 0.1W STOP/EJECT
3146	3198 021 51040	100 k 0.1W REC
3150	3198 021 51830	18 k 0.1W STOP/EJECT
3150	3198 021 51080	1 Ω DOWN
3154	3198 021 51830	18 k 0.1W STOP/EJECT
3154	3198 021 58220	8.2 k 0.1W PLAY
3156	3198 021 53920	3.9 k 0.1W REW
3156	3198 021 54710	470 Ω 0.1W UP
3157	3198 021 53920	3.9 k 0.1W REW
3159	3198 021 58220	8.2 k 0.1W PLAY
3161	3198 021 53920	3.9 k 0.1W REW
3161	3198 021 58220	8.2 k 0.1W PLAY
3163	3198 021 55620	5.6 k 0.1W WIND
3170▲	2120 106 90603	470 Ω 0.1W
3171	3198 021 51830	18 k 0.1W
3172	3198 021 52210	220 Ω 0.1W
3173	3198 021 51080	1 Ω
3173	3198 021 55620	5.6 k 0.1W
3174	3198 021 54730	47 k 0.1W
3175	3198 021 51030	10 k 0.1W
3176	3198 021 51080	1 Ω
3300	2120 108 92624	4.7 k 1%
3302	3198 011 02210	220 Ω 0.17W
3303	3198 021 51030	10 k 0.1W
3305	3198 021 52240	220 k 0.1W
3306	2120 108 92624	4.7 k 1%
3307▲	2322 205 33229	22 Ω FUSE
3308▲	2120 106 90633	100 Ω
3309	2322 156 23309	33 Ω 1%
3312	3198 021 51080	1 Ω
3314	2322 156 21508	1.5 Ω 1%
3315	3198 012 32230	22 k 3W
3316▲	2322 205 33229	22 Ω FUSE
3318▲	2322 207 33102	1 k FUSE NFR25H
3319	3198 011 04780	4.7 Ω 0.17W
3320	3198 011 03340	330 k 0.17W
3321	3198 021 52240	220 k 0.1W
3324▲	2322 242 13335	3.3 M
3325▲	2322 242 13335	3.3 M
3326	2120 103 90018	220 Ω
3327	3198 011 01820	1.8 k 0.17W

3328	2322 156 23309	33 Ω 1%
3329	3198 011 04730	47 k 0.17W
3330	3198 021 54710	470 Ω 0.1W
3331	2322 156 21508	1.5 Ω 1%
3332	3198 021 54710	470 Ω 0.1W
3334	3198 011 01210	120 Ω 0.17W
3336	2120 108 92632	33 k 1%
3343	3198 021 51040	100 k 0.1W
3344	3198 021 52230	22 k 0.1W
3345	3198 021 54730	47 k 0.1W
3347	3198 021 51080	1 Ω
3350	3198 021 51040	100 k 0.1W
3351	3198 021 51030	10 k 0.1W
3352	3198 021 51030	10 k 0.1W
3353	3198 021 54720	4.7 k 0.1W
3459	3198 021 52210	220 Ω 0.1W
3460	3198 021 51030	10 k 0.1W
3461	3198 021 54710	470 Ω 0.1W
3462	3198 021 54710	470 Ω 0.1W
3463	3198 021 54710	470 Ω 0.1W
3464▲	2322 205 33228	2.2 Ω NFR25
3465	2306 197 90039	RES OR56 for M63100FP
3465	2322 193 95074	RST 0Ω47 for M63100AFP
3466	3198 021 54710	470 Ω 0.1W
3467	3198 021 51080	1 Ω
3468	3198 021 58230	82 k 0.1W
3470	3198 021 52210	220 Ω 0.1W
3471	3198 021 54720	4.7 k 0.1W
3472	3198 021 53310	330 Ω 0.1W
3473	3198 021 55620	5.6 k 0.1W
3474	3198 021 54730	47 k 0.1W
3475	3198 011 01830	18 k 0.17W
3476	3198 011 04740	470 k 0.17W
3476	3198 011 01040	100 k 0.17W
3477	2120 101 74274	270 k
3478	2120 101 74274	270 k
3479	3198 021 52250	2.2 M 0.1W
3480	3198 011 03910	390 Ω 0.17W
3481	3198 011 03330	33 k 0.17W
3482	3198 011 03330	33 k 0.17W
3484	3198 011 01030	10 k 0.17W
3485	3198 011 04720	4.7 k 0.17W
3486	3198 011 01030	10 k 0.17W
3489	3198 011 03910	390 Ω 0.17W
3502	3198 021 56830	68 k 0.1W
3503	3198 021 58210	820 Ω 0.1W
3504	3198 011 01010	100 Ω 0.17W
3505	3198 011 01010	100 Ω 0.17W
3506	3198 021 58210	820 Ω 0.1W
3507	3198 021 53320	3.3 k 0.1W
3508	2120 108 91725	270 k 0.1W
3509	3198 021 53320	3.3 k 0.1W
3510	3198 011 04790	47 Ω 0.17W
3512	3198 011 04790	47 Ω 0.17W
3521	3198 021 51010	100 Ω 0.1W
3530	3198 021 54720	4.7 k 0.1W
3531	3198 021 51040	100 k 0.1W
3532	3198 021 52230	22 k 0.1W
3533	3198 021 51530	15 k 0.1W
3534	3198 021 54720	4.7 k 0.1W
3535	3198 021 54720	4.7 k 0.1W
3536	3198 021 52220	2.2 k 0.1W
3537	3198 021 52220	2.2 k 0.1W
3538	3198 021 54720	4.7 k 0.1W
3539	3198 021 51060	10 M
3540	3198 021 51060	10 M
3541	3198 021 53330	33 k 0.1W
3542	3198 021 53330	33 k 0.1W
3543	3198 021 53330	33 k 0.1W
3544	3198 021 53330	33 k 0.1W
3545	3198 021 53330	33 k 0.1W
3546	3198 021 53330	33 k 0.1W
3547	3198 021 51030	10 k 0.1W
3548	3198 021 53940	390 k 0.1W
3549	3198 021 51030	10 k 0.1W
3550	3198 021 51030	10 k 0.1W
3601	3198 021 54730	47 k 0.1W
3602	3198 011 04730	47 k 0.17W
3603	3198 021 58220	8.2 k 0.1W
3604	3198 021 58220	8.2 k 0.1W
3605	3198 021 52250	2.2 M 0.1W
3606	3198 021 52730	27 K 0.1W
3607	3198 021 53320	3.3 k 0.1W
3608	3198 011 01210	120 Ω 0.17W
3609	3198 011 01210	120 Ω 0.17W
3610	3198 021 51030	10 k 0.1W
3611	3198 021 53320	3.3 k 0.1W
3612	3198 021 54750	4.7 M 0.1W
3613	3198 021 53390	33 Ω 0.1W
3614	3198 021 51830	18 k 0.1W
3615	3198 021 52240	220 k 0.1W
3616	3198 021 54720	4.7 k 0.1W
3617	3198 021 54720	4.7 k 0.1W
3619	3198 021 51030	10 k 0.1W
3621	3198 021 52230	22 k 0.1W
3622	3198 021 51230	12 k 0.1W
3623	3198 021 52220	2.2 k 0.1W
3624	3198 021 55610	560 Ω 0.1W
3625	2120 368 90126	100 k POT
3626	3198 021 54730	47 k 0.1W
3627	3198 021 58220	8.2 k 0.1W
3629	3198 021 51230	12 k 0.1W
3630	3198 021 51090	10 Ω 0.1W
3631	3198 021 52290	22 Ω 0.1W
3632	3198 021 51230	12 k 0.1W
3633	3198 021 52220	2.2 k 0.1W
3634	3198 021 54730	47 k 0.1W
3635	3198 021 53330	33 k 0.1W
3636	3198 021 53940	390 k 0.1W
3637	3198 021 51510	150 Ω 0.1W
3638	2120 109 09158	1.5 Ω
3639	3198 021 54730	47 k 0.1W
3640	3198 021 55610	560 Ω 0.1W
3641	3198 021 56810	680 Ω 0.1W
3642	3198 021 52230	22 k 0.1W
3644	3198 021 51040	100 k 0.1W
3650	2120 108 92633	39 k 1%
3651	3198 011 01010	100 Ω 0.17W
3652	3198 011 01010	100 Ω 0.17W
3653	3198 021 51020	1 k 0.1W
3654	3198 021 53330	33 k 0.1W
3655	3198 021 52720	2.7 k 0.1W
3656	3198 021 53330	33 k 0.1W
3657	3198 021 52720	2.7 k 0.1W
3658	3198 021 54710	470 Ω 0.1W
3659	3198 021 54750	4.7 M 0.1W
3660	3198 021 51040	100 k 0.1W
3661	3198 021 51040	100 k 0.1W
3700	3198 021 54710	470 Ω 0.1W
3701	3198 021 53930	39 k 0.1W
3702	3198 021 51040	100 k 0.1W
3703	3198 021 51830	18 k 0.1W
3704	3198 021 53330	33 k 0.1W
3705	3198 011 06810	680 Ω 0.17W
3706	3198 021 53310	330 Ω 0.1W
3707	2120 368 90124	22 k POT
3708	3198 021 51830	18 k 0.1W
3709	3198 021 51540	150 k 0.1W
3710	3198 021 52210	220 Ω 0.1W
3711	3198 021 53320	3.3 k 0.1W
3712	3198 021 51020	1 k 0.1W
3714	3198 021 51010	100 Ω 0.1W
3715	3198 021 53310	330 Ω 0.1W PAL BG
3715	3198 021 52210	220 Ω 0.1W PAL I
3715	3198 021 52710	270 Ω 0.1W SEC
3716	3198 011 02220	2.2 k 0.17W
3717	3198 021 52720	2.7 k 0.1W
3718	3198 021 52220	2.2 k 0.1W
3719	3198 021 56820	6.8 k 0.1W
3720	3198 021 54710	470 Ω 0.1W
3721	3198 021 54720	4.7 k 0.1W
3722	3198 021 51010	100 Ω 0.1W
3723	3198 021 51010	100 Ω 0.1W
3724	3198 021 52230	22 k 0.1W
3725	3198 021 54710	470 Ω 0.1W
3726	3198 011 01020	1 k 0.17W
3727	3198 021 55620	5.6 k 0.1W
3728	3198 021 55620	5.6 k 0.1W
3729	3198 021 55620	5.6 k 0.1W
3730	2120 368 90126	100 k POT
3731	3198 011 04710	470 Ω 0.17W
3732	3198 021 53310	330 Ω 0.1W
3733	3198 021 52720	2.7 k 0.1W
3734	3198 021 51510	150 Ω 0.1W
3762	3198 021 55620	5.6 k 0.1W
3763	3198 021 90020	CHIP jumper
3764	3198 021 54730	47 k 0.1W
3765	3198 011 01010	100 Ω 0.17W
3766	3198 011 01010	100 Ω 0.17W
3767	3198 011 01010	100 Ω 0.17W
3768	3198 021 55620	5.6 k 0.1W
3769	3198 011 01010	100 Ω 0.17W
3770	3198 021 51020	1 k 0.1W
3771	2120 108 91686	7.5 k
3775	3198 021 54710	470 Ω 0.1W
3776	3198 021 54710	470 Ω 0.1W
3796	3198 021 51020	1 k 0.1W
3797	3198 011 01020	1 k 0.17W
3798	3198 011 01020	1 k 0.17W
3799	3198 011 01020	1 k 0.17W
3800▲	2120 106 90597	10 Ω FUSE
3801	3198 021 52730	27 K 0.1W
3802	3198 011 04780	4.7 Ω 0.17W
3803	3198 021 52220	2.2 k 0.1W
3804	3198 021 55630	56 k 0.1W
3805▲	2120 106 90597	10 Ω FUSE
3806	3198 021 54730	47 k 0.1W
3807	3198 021 51040	100 k 0.1W
3808	3198 011 03310	330 Ω 0.17W
3809	3198 011 03310	330 Ω 0.17W
3810	3198 011 03310	330 Ω 0.17W
3811	3198 011 03310	330 Ω 0.17W
3812	3198 011 08210	820 Ω 0.17W
3813	3198 021 51030	10 k 0.1W
3814	3198 021 52210	220 Ω 0.1W
3815	3198 021 53330	33 k 0.1W
3816	3198 011 04710	470 Ω 0.17W
3817	3198 011 04710	470 Ω 0.17W
3818	3198 021 56820	6.8 k 0.1W
3819	3198 011 01030	10 k 0.17W
3820	3198 011 04710	470 Ω 0.17W
3821	3198 011 01010	100 Ω 0.17W
3822	3198 021 54730	47 k 0.1W
3823	3198 021 54730	47 k 0.1W
3824	3198 011 01030	10 k 0.17W
3825	3198 011 01010	100 Ω 0.17W
3826	3198 021 51030	10 k 0.1W
3827	3198 011 01020	1 k 0.17W
3828	3198 021 51030	10 k 0.1W
3829	3198 021 51020	1 k 0.1W
3830	3198 021 52210	220 Ω 0.1W
3831	3198 021 52220	2.2 k 0.1W
3832	3198 021 51030	10 k 0.1W
3833	3198 011 01030	10 k 0.17W
3834	3198 021 54710	470 Ω 0.1W
3835	3198 011 08220	8.2 k 0.17W
3836	3198 011 01020	1 k 0.17W
3837	3198 011 01030	10 k 0.17W
3838	3198 011 01030	10 k 0.17W
3839	3198 021 51030	10 k 0.1W
3840	3198 021 51020	1 k 0.1W
3841	3198 021 51020	1 k 0.1W
3842	3198 011 08220	8.2 k 0.17W
3843	3198 021 51020	1 k 0.1W
3844	3198 011 01030	10 k 0.17W
3845	3198 021 51020	1 k 0.1W
3846	3198 011 01010	100 Ω 0.17W
3847	3198 021 52220	2.2 k 0.1W
3848	3198 011 01010	100 Ω 0.17W
3849	3198 021 54710	470 Ω 0.1W
3850	3198 011 01030	10 k 0.17W
3851	3198 011 02220	2.2 k 0.17W
3852	3198 011 02220	2.2 k 0.17W
3853	3198 021 54710	470 Ω 0.1W
3854	3198 021 52230	22 k 0.1W
3855	3198 021 52220	2.2 k 0.1W
3856	3198 011 02220	2.2 k 0.17W
3857	3198 021 51030	10 k 0.1W
3858	3198 011 01030	10 k 0.17W
3859	3198 021 51020	1 k 0.1W
3860	3198 021 54720	4.7 k 0.1W
3861	3198 021 54710	470 Ω 0.1W
3862	3198 011 04730	47 k 0.17W
3863	3198 021 51530	15 k 0.1W
3864	3198 021 54730	47 k 0.1W
3865	3198 021 51830	18 k 0.1W
3866	3198 021 51020	1 k 0.1W
3867	3198 011 01030	10 k 0.17W
3868	3198 011 01030	10 k 0.17W
3869	3198 021 51020	1 k 0.1W
3870	3198 021 51830	18 k 0.1W
3871	3198 021 51030	10 k 0.1W
3872	3198 021 51020	1 k 0.1W
3874	3198 021 51830	18 k 0.1W
3875	3198 021 54720	4.7 k 0.1W
3876	3198 021 54720	4.7 k 0.1W
3878	3198 021 52220	2.2 k 0.1W
3879	3198 021 51030	10 k 0.1W
3880	3198 011 01020	1 k 0.17W
3881	3198 021 51830	18 k 0.1W
3882	3198 011 01030	10 k 0.17W
3883	3198 021 52230	22 k 0.1W
3885	3198 021 51220	1.2 k 0.1W
3886	3198 011 03920	3.9 k 0.17W
3887	3198 021 52230	22 k 0.1W
3888	3198 021 52230	22 k 0.1W
3889	3198 021 51030	10 k 0.1W
3890	3198 011 01030	10 k 0.17W
3891	3198 021 54720	4.7 k 0.1W
3892	3198 021 56830	68 k 0.1W
3893	3198 021 56830	68 k 0.1W
3894	3198 021 56830	68 k 0.1W
3895	3198 021 56830	68 k 0.1W
3896	3198 021 54720	4.7 k 0.1W
3897	3198 021 54730	47 k 0.1W
3898	3198 021 51520	1.5 k 0.1W
3899	3198 011 01030	10 k 0.17W
3901	3198 021 51030	10 k 0.1W
3901	3198 021 52220	2.2 k 0.1W
3902	3198 021 57590	75 Ω 0.1W
3903	2122 551 00008	VDR MAX 21V
3904	2122 551 00008	VDR MAX 21V

3905	2122 551 00008	VDR MAX 21V
3906	2122 551 00008	VDR MAX 21V
3907	2122 551 00008	VDR MAX 21V
3908	2122 551 00008	VDR MAX 21V
3909	2122 551 00008	VDR MAX 21V
3910	3198 021 51040	100 k 0.1W
3911	3198 021 51040	100 k 0.1W
3912	3198 021 57590	75 Ω 0.1W
3913	3198 021 57590	75 Ω 0.1W
3914	3198 021 56820	6.8 k 0.1W
3915	2122 551 00008	VDR MAX 21V
3916	3198 021 56820	6.8 k 0.1W
3917	3198 021 54720	4.7 k 0.1W
3918	3198 021 56820	6.8 k 0.1W
3919	3198 021 51040	100 k 0.1W
3920	3198 011 06820	6.8 k 0.17W
3921	3198 021 57590	75 Ω 0.1W
3922	3198 011 02210	220 Ω 0.17W
3923	3198 021 52210	220 Ω 0.1W
3924	3198 011 02210	220 Ω 0.17W
3925	3198 021 52210	220 Ω 0.1W
3926	3198 021 51040	100 k 0.1W
3927	3198 021 54720	4.7 k 0.1W
3928	3198 021 54710	470 Ω 0.1W
3929	3198 021 57590	75 Ω 0.1W
3930	3198 021 52210	220 Ω 0.1W
3931	3198 021 52210	220 Ω 0.1W
3932	3198 021 52210	220 Ω 0.1W
3933	3198 021 52210	220 Ω 0.1W
3934	3198 021 54710	470 Ω 0.1W
3935	3198 021 54790	47 Ω 0.1W
3936	3198 021 51030	10 k 0.1W
3937	3198 021 54790	47 Ω 0.1W
3938	3198 021 51020	1 k 0.1W
3939	3198 011 08210	820 Ω 0.17W
3940	3198 021 52210	220 Ω 0.1W
3941	3198 021 52210	220 Ω 0.1W
3942	3198 021 53910	390 Ω 0.1W
3943	3198 021 51030	10 k 0.1W
3944	3198 021 56830	68 k 0.1W
3945	3198 021 56820	6.8 k 0.1W
3946	3198 021 54720	4.7 k 0.1W
3947	3198 021 54790	47 Ω 0.1W
3948	3198 021 51010	100 Ω 0.1W
3949	3198 011 01010	100 Ω 0.17W
3952	3198 021 54720	4.7 k 0.1W
3953	3198 011 01040	100 k 0.17W
3954	3198 021 51040	100 k 0.1W
3955	3198 021 51040	100 k 0.1W
3956	3198 021 51040	100 k 0.1W
3957	2122 551 00008	VDR MAX 21V
3958	2122 551 00008	VDR MAX 21V
3959	2122 551 00008	VDR MAX 21V
3960	2122 551 00008	VDR MAX 21V
3961	3198 021 51510	150 Ω 0.1W
3961	3198 021 51080	1 Ω for frontchinch sub
3962	3198 011 06820	6.8 k 0.17W
3963	3198 021 51010	100 Ω 0.1W
3964	3198 021 51010	100 Ω 0.1W
3965	3198 021 51010	100 Ω 0.1W
3966	3198 011 06820	6.8 k 0.17W
3967	3198 021 51010	100 Ω 0.1W

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5000	2422 535 97877	10 µH
5001	2422 535 97877	10 µH
5002	2422 535 97877	10 µH
5003	2422 535 97877	10 µH
5004	3198 018 15690	56 µH
5006	3198 018 11010	100 µH
5007	2422 535 94885	470 µH
5071	3198 018 16880	6.8 µH
5072	2422 535 97877	10 µH
5073	3198 018 15690	56 µH
5074	3198 018 12290	22 µH
5075	3198 018 12790	27 µH
5170	2422 535 97877	10 µH
5300	3198 018 90020	BEAD 100mH z
5301⚠	3128 138 39060	MAINS TRANSFORMER
5302	3198 018 21090	10 µH
5304	2422 535 94639	10 µH
5305	2422 549 44287	MAINS TER
5306	2422 535 94674	330 nH
5307	3198 018 90080	COIL
5308	3198 018 90080	COIL
5460	2422 535 94674	330 nH
5500	3198 018 11090	10 µH
5501	3198 018 11090	10 µH
5502	3198 018 11090	10 µH
5600	3103 138 24910	COIL ASSY
5605	3198 018 90080	COIL
5610	2422 535 97877	10 µH at pos of 9412
5650	3198 018 26880	6.8µH
5651	3198 018 12290	22 µH
5701	3198 018 11590	15 µH
5702	2422 549 44162	COIL VAR
5703	3198 018 90080	COIL
5704	2422 549 44162	COIL VAR
5706	3198 018 16880	6.8 µH
5707	2422 535 97875	6.8 µH
5708	3198 018 11090	10 µH
5709	3198 018 90090	COIL
5710	3198 018 13990	39 µH
5760	3198 018 21090	10 µH
5761	3198 018 21010	COIL
5762	3198 018 21090	10 µH
5763	3198 018 90080	COIL
5901	2422 535 97877	10 µH
5904	2422 535 94306	COIL
5905	3198 018 90080	COIL
5906	3198 018 90080	COIL

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6170	9322 154 48667	IR TSOP2236 with holder
6170	9322 155 82667	IR TSOP2236 without holder
6171	9336 247 60133	BAT85
6300	9337 234 20133	BYD33J
6301	9322 103 46673	SBYV27-200
6302	9322 126 71673	BYT42M
6304	9334 515 80673	1N4003
6305	9334 515 80673	1N4003
6306	9337 234 00133	BYD33D
6307	3198 010 10070	BAV21
6308	9337 234 00133	BYD33D
6309	9322 128 68682	SB360
6310	9338 386 60673	1N4006GP
6311	9338 386 60673	1N4006GP
6312	9338 386 60673	1N4006GP
6313	9338 386 60673	1N4006GP
6315	3198 010 54780	BZX79-B4V7
6316	3198 010 53980	BZX79-B3V9
6317	9340 255 30115	BAS216
6317	9322 128 15685	MCL4148 TEGO optional
6460	3103 138 87290	Kit: 2x Sens. + 1x LED
6601	9322 145 52685	BZM55-B7V5 R
6602	9340 387 00115	BZX284-C12
6602	9322 129 41685	BZM55C12 TEGO optional
6702	9340 255 20115	BA792
6760	3198 010 10010	1N4148
6761	9340 255 30115	BAS216
6761	9322 128 15685	MCL4148 TEGO optional
6801	9336 247 60133	BAT85
6802	9340 386 40115	BZX284-C6V8
6803	9340 386 40115	BZX284-C6V8
6804	3198 010 10010	1N4148
6805	3198 010 10010	1N4148
6901	9340 386 40115	BZX284-C6V8
6902	9322 032 16673	MTZJ12C
6903	9322 032 16673	MTZJ12C
6904	9340 387 00115	BZX284-C12
6904	9322 129 41685	BZM55C12 TEGO optional
6905	9340 386 40115	BZX284-C6V8
6906	9340 386 40115	BZX284-C6V8
6907	9340 387 00115	BZX284-C12
6907	9322 129 41685	BZM55C12 TEGO optional
6908	9340 386 40115	BZX284-C6V8
6909	9340 387 00115	BZX284-C12
6909	9322 129 41685	BZM55C12 TEGO optional
6910	9340 387 00115	BZX284-C12
6910	9322 129 41685	BZM55C12 TEGO optional
6911	9340 386 40115	BZX284-C6V8
6912	9340 386 40115	BZX284-C6V8
6913	9340 387 00115	BZX284-C12
6913	9322 129 41685	BZM55C12 TEGO

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7002	9330 921 11215	BFS20
7003	9330 921 11215	BFS20
7004	8203 107 03040	LA71595M (SUPER YCA)
7005	3198 010 42310	BC847BW
7006	3198 010 42320	BC857BW
7008	3198 010 42310	BC847BW
7009	3198 010 44220	DTA124EU
7010	3198 010 42310	BC847BW
7071	3198 010 42320	BC857BW
7072	9322 147 59682	LA7339A
7073	3198 010 42310	BC847BW
7075	3198 010 42310	BC847BW
7077	3198 010 42310	BC847BW
7170	2722 171 07186	DISPLAY
7172	3198 010 44320	DTC124EU
7300⚠	9322 127 19682	OPT CP TCET1101G
7301	9322 086 97676	TL431ACZ-AP S
7302	9322 136 93687	FET 2SK2750
7303	9322 136 56682	MC44608P40 L
7306	9322 147 95668	FET 2SK2839
7307	3198 010 44320	DTC124EU
7308	3198 020 43430	BC327-25
7309	3198 010 42310	BC847BW
7310	3198 010 44320	DTC124EU
7315	3198 010 42310	BC847BW
7316	3198 010 42320	BC857BW
7350	3198 020 43530	BC337-25
7351	3198 010 42320	BC857BW
7461	3103 138 87290	Kit: 2x Sens. + 1x LED
7462	3103 138 87290	Kit: 2x Sens. + 1x LED
7463	9322 054 99668	M63100FP
7464	9322 097 89682	OPT CP TCRT5000L
7465	9322 097 89682	OPT CP TCRT5000L
7466	9322 097 91682	OPT CP TCST1030L
7501	3198 010 42320	BC857BW
7502	9322 136 21668	SDA5652-2X
7530	9339 476 70668	LM339DT
7531	3198 010 42310	BC847BW
7532	3198 010 42310	BC847BW
7601	3198 010 42310	BC847BW
7602	9335 897 30215	BC856B
7603	9331 795 40126	BC327-40
7604	9335 895 60215	BC846B
7606	3198 010 42310	BC847BW
7607	9335 895 60215	BC846B
7608	3198 010 43240	BC817-40
7650	9352 615 79557	TDA9605H
7701	9333 729 60653	HEF4053BT
7702	3198 010 44320	DTC124EU
7703	3198 010 42310	BC847BW
7704	3198 010 42320	BC857BW
7705	9352 621 13118	TDA9817T/V1 R
7705	9352 606 11118	TDA9818T/V1 R
7706	3198 010 42310	BC847BW
7760	9352 640 81557	TDA9873HZ
7761	9322 147 97668	MSP3415D-QG-B3
7800	3198 010 42310	BC847BW
7801	3198 010 42310	BC847BW
7802	3198 010 42310	BC847BW
7803	3198 010 42320	BC857BW
7804	3198 020 43530	BC337-25
7807	3198 010 42310	BC847BW
7808	3198 010 42310	BC847BW
7809	3198 010 44220	DTA124EU
7811	3198 010 42310	BC847BW
7812	9331 795 40126	BC327-40
7818	9322 120 64668	M24C08-MN6
7899	3103 165 13320	TMP93CW76F-ACAP1-xU
7899	3103 165 13330	TMP93CW76F-ACAP2-xU
7899	3103 165 13340	TMP93CW76F-ACAP3-xU
7899	3103 165 13350	TMP93CW76F-ACAP4-xU
7899	3103 165 13360	TMP93CW76F-ACAP5-xU
7899	3103 165 13370	TMP93CW76F-ACAP6-xU
7899	3103 165 13380	TMP93CW76F-ACAB1-xU
7904	9322 124 28682	STV6401
7905	3198 010 42040	BC847C
7906	3198 010 42040	BC847C
7907	3198 010 42310	BC847BW
7908	3198 010 42310	BC847BW
7909	3198 010 42320	BC857BW
7910	3198 010 42310	BC847BW
7911	9333 729 60653	HEF4053BT
7912	3198 010 42310	BC847BW
7913	3198 010 43240	BC817-40
7914	3198 010 42310	BC847BW
7917	3198 010 42040	BC847C
9759	3198 021 90020	CHIP JUMPER